

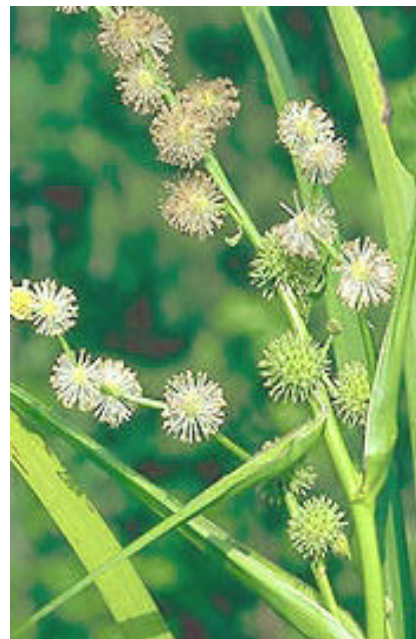
Prepared For:

Town of Franklin
150 Emmons Street
Franklin, MA 02038

August 2003



FRANKLIN WETLAND REPLICATION ASSESSMENT PROJECT



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TOWN OF FRANKLIN

WETLAND REPLICATION ASSESSMENT PROJECT

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SECTION 1: INTRODUCTION

1.1 Project Objectives and Goals

...the majority of wetland replication projects undertaken in the Commonwealth do not meet the minimum performance standards in the regulations.

MA –DEP, Massachusetts Inland Wetland Replication Guidelines

Failure is the opportunity to begin again more intelligently.

Henry Ford

As stated in the *Massachusetts Inland Wetland Replication Guidelines*, many replication projects fail to meet performance standards simply because no replication area was ever built or because of problems related to design or construction (i.e. inadequate hydrology, poor planting plans, or replication areas built smaller than required). To proactively evaluate past wetland replication projects and improve the success rate of future replications, the Town of Franklin Conservation Commission was awarded grant funding in 2002 from the U.S. Environmental Protection Agency to conduct the *Franklin Wetland Replication Assessment Project*. The Town selected GeoSyntec Consultants, in cooperation with BSC Group, Inc., to conduct this project.

The primary goals of this project were:

1. To evaluate the successful establishment of replicated wetlands in the Town of Franklin in terms of wetland functions and values, species composition, soils, and hydrology.
2. To evaluate if replicated wetlands have been constructed in substantial compliance with approved plans and design specifications.
3. Based on the evaluations described above, to develop recommendations for future wetland replication design specifications and related protocols (i.e. construction oversight, post-project monitoring, etc.).



Square-stemmed Monkey Flower
(*Mimulus ringens*)

1.2 Acknowledgements

GeoSyntec would like to acknowledge the support and contributions to this project by Mr. Richard Vacca (Franklin Environmental Planner/Town Ecologist, Project Manager), Mr. Nicholas Alfieri (Franklin GIS Planner/Adjunct Conservation Agent), Mr. Pearce Murphy (Franklin Conservation Commission) and Ms. Jeanne Cosgrove (EPA Project Officer).



SECTION 2: PROJECT METHODOLOGY

We have to remember that what we observe is not nature in itself but nature exposed to our method of questioning.

Werner Heisenberg

2.1 Review and Assessment of Existing Data

The GeoSyntec/BSC Group Team (GeoSyntec) held a project kick-off meeting with Town staff on August 29, 2002 to finalize the goals, methodologies and data management protocols for this project. At a second meeting on September 4, 2002, GeoSyntec coordinated with the Town to select twelve wetland replication sites for inclusion in the study.

The twelve sites were selected from the pool of 32 wetland replication projects that were constructed between the years of 1987 to 1998 and had been issued a Certificate of Compliance by the Franklin Conservation Commission. Conservation Commission files for each of the sites were reviewed, including site plans, Notice of Intent filings, Orders of Conditions, wetland replication specifications, and any other relevant available data (consultant reports, Town Assessor's maps, etc.). The following types of information were assessed in order to rank the wetland replication projects for inclusion in this study:



Wood Frog (*Rana sylvatica*)

- Year Approved/Constructed
- Project Size (square feet)
- Availability of replication construction specifications in permit information, including:
 - Grading specifications
 - Soils
 - Required plantings/planting locations
 - Seed mixture specifications
- Ease of field-locating replication area boundaries (nearby control points, etc.)
- Unique features (i.e. vernal pool, etc.)
- Availability of as-built plan *
- Availability of post-construction replication monitoring data *

* Note: None of the reviewed projects had these types of information available.



Based on review the above information, with an emphasis placed on the availability of detailed replication construction specifications, 9 of the 32 sites were eliminated from consideration for inclusion in the study. The remaining 23 sites were ranked from 1 to 4, with 4 indicating the highest ranking for inclusion in the study. The sites were then categorized into the following three age groups: (1) 0-5 years, (2) 5-10 years, and (3) over 10 years. The goal was to select the highest ranking sites representing each of these project age categories, while also ensuring that a wide range of project sizes were included in the study group.

Following selection of the 12 wetland replication sites to be included in this study, the Town provided GeoSyntec with copies of all site plans, permits, design specifications and other available information relevant to the replication areas. Site maps and approved replication plans for the 12 selected sites are included as an appendix to this document (provided under separate cover). GeoSyntec reviewed and assessed the specific features of each replication area prior to commencing field data collection. This information was be used as a reference during field data collection, to ensure that data collection activities were properly tailored to each specific site (i.e. documenting presence and survival of planted shrubs and trees in locations specified on a site plan, documenting presence of wetland soils as specified, etc.). This information was also used to assess the adequacy of each site's permit requirements and related design specifications in relation to the site's current wetland features.

It should be noted that none of the 12 selected sites (and none of the 32 sites in the original site selection pool) had post-construction monitoring data or as-built plans. In general, the distinction between the permit requirements/design specifications for the 12 sites fell into four categories:

- Replication location and size indicated on site plan
- Location and size, plus grading and soil specifications
- Location and size, grading and soil specifications, plus "suggested" plantings
- Detailed replication plan, including grading, soils and planting specifications



Great Blue Heron
(*Ardea herodias*)

2.2 Field Data Collection Methods

2.2.1 Wetland Field Data

GeoSyntec collected field data for the wetland replication areas on a digital Wetland Replication Data Form that was created specifically for this project. Each wetland was classified according to the National Wetland Inventory (NWI) classification hierarchy. Where appropriate, a dominant NWI class was assigned to the wetland and other NWI classes present were noted. The quantity and location of monitoring plots for each wetland replication area was determined based on its size and the variety of features it exhibits. In larger, more complex replication areas (i.e. multiple NWI classes, significant variations in dominant vegetation, etc.), an appropriate number of plots were selected so as to represent overall conditions for the entire replication. Each replication area and each monitoring plot was photo-documented with a digital camera to show overall conditions and each NWI class present.



In addition to general survey information (i.e. date, time, weather, etc.), the following site-specific information was collected and entered into the digital Data Form:

- **Vegetation:** Within each monitoring plot, GeoSyntec recorded the presence and dominance of plant species within the following four vegetation layers: Trees, Shrubs, Saplings/Lianas, and Herbs. The dominance of each species within these layers was estimated within the following four categories: Dominant (>50%), Abundant (26-50%), Common (5-25%) and Scarce (<5%).
- **Hydrologic Characteristics:** GeoSyntec recorded representative hydrologic features for each wetland plot. This included an assessment of the frequency and duration of surface saturation/flooding, and documentation of hydrologic indicators (i.e. silt deposition, water-stained leaves, depth to groundwater or soil saturation, etc).
- **Soils:** GeoSyntec recorded information from a soil profile within each monitoring plot. The soil profile was established to a minimum depth of 18 inches (unless bedrock/refusal was reached before this point). The depth of each soil horizon within the profile was recorded, as well as the matrix color (based on a Munsell Soil Color Chart), texture, redoximorphic features, and any other general observations.
- **Unique Vegetation and/or Invasive Species Notes:** GeoSyntec documented and field-located with a GPS unit the presence and relative abundance of any “unique” vegetation and non-native invasive species found in each wetland, as follows:
 - “Unique vegetation” was defined to include species that are (1) listed as rare, threatened or endangered in Massachusetts, as listed by the Massachusetts Natural Heritage and Endangered Species Program. “Invasive species” was defined to include the non-native invasive plants listed in “*A Guide to Invasive Plants in Massachusetts*”, published by the Massachusetts Division of Fisheries and Wildlife – Biodiversity Initiative.
- **Wetland Delineation:** GeoSyntec field-delineated the wetland boundaries of wetland replication areas according to the appropriate state and/or federal methodologies. Wetlands defined as Wetland Resource Areas under the Massachusetts Wetlands Protection Act (WPA) were mapped according to the state methodology. Wetlands not jurisdictional under the WPA were mapped according to the federal methodology. Wetland delineations were field-located with a mapping-grade GPS unit with sub-meter accuracy.



Glossy Buckthorn
(*Rhamnus frangula*)

2.2.2 Data Collection for Evaluation of Wetland Replication Compliance

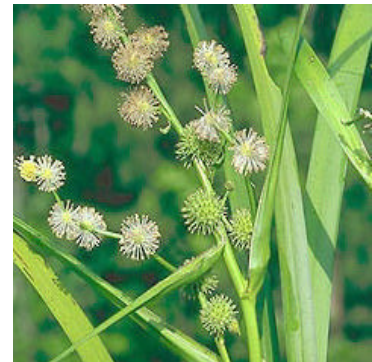
Some of the field data collected as described above in Section 2.2.1 was used to evaluate if the wetland replication area was constructed in substantial compliance with the approved wetland replication plan. This evaluation included the following:



Wetland Delineation: The wetland delineations conducted for each replication area were used for comparison to the replication design plans approved as part of the Order of Conditions issued for the site. This comparison allowed GeoSyntec to determine if the replication area was sized and sited according to the approved plan.

Soils Information: Many of the replication areas the study included design specifications with regard to soils. For example, a common requirement was for wetland soils from impacted areas to be stockpiled and then replaced in the replication area. Soil profiles (conducted as described above) were compared to the site's permitted design specifications to determine if current site conditions are consistent with the grading and soil-related construction specifications.

Species Composition: Some of the replication sites had design requirements related to planting of specific wetland herbaceous, shrub, and tree species. Vegetation information collected at each site (as described above) was used to assess the current presence of such species on the site. Where specific planting locations were provided in the plans (usually for tree/shrub plantings), these locations were assessed for the presence/survival of the planting.



Bur-reed
(*Sparganium americanum*)

It should be noted that some replication plans included a “suggested” planting plan rather than “required” plan. At these sites, the presence or absence of species could not be used to assess compliance with design specifications.

It should also be noted that the vegetation community within a replicated wetland may change dramatically over time, regardless of the seed mix or plantings used at the time of construction. Such variations in plant dominance can often be related to the spread of aggressively colonizing species (including invasive species such as Purple Loosestrife) from adjacent wetland areas. As such, the species within a replication area may provide evidence that a planting plan was followed according to permit specifications, but cannot conclusively indicate that specifications were not followed.

2.2.3 GPS/GIS Data Collection

GeoSyntec developed a wetland assessment MS-Access database to store all field data collected. This database allowed GeoSyntec staff to conduct real-time maintenance of field data and related assessment information. An integrated mapping-grade Global Positioning System (GPS) connected to a ruggedized “pocket” computer loaded with orthophotography and existing GIS data layers were used to collect and record wetland information. Field data was entered into the hand-held computer using customized forms from the JetStream™ software package, a field data collection software that integrates both spatial (GIS) and relational tabular data. In addition to greatly improving quality assurance through the elimination of transcription of paper forms and digitization of paper maps, the digital forms were designed to limit responses so that all information collected conforms to the standard protocols established.

The wetland replication field surveys involved assignment of a GPS unit to the field crew along with a pocket computer and digital camera. The GPS unit was used to field-locate wetland boundaries,



monitoring plot locations, and the locations of unique species and invasive species infestations. The GPS unit was also used to locate fixed control points in the vicinity of each wetland, such as the edges of roads and the corners of buildings. The pocket computer was pre-loaded with database tables and field data forms to allow field staff to record attribute data for each wetland, as well as GIS coverages for field editing and quality assurance review. The GPS unit was operated with settings that ensure sub-meter accuracy for each recorded point.

In addition to collecting digital information on each wetland replication area, GeoSyntec also created hard copy and digital maps of each wetland replication. These maps were created presenting the GPS data as an overlay on digital orthophotos obtained from the Massachusetts Geographic Information System (MassGIS).

2.2.4 Wetland Functions and Values Assessment

GeoSyntec assessed the functions and values of each wetland replication area according to the methodology developed by the US Army Corps of Engineers (ACOE) and published in a booklet titled *“Wetland Functions and Values – A Descriptive Approach”* (see excerpts in Appendix B). This methodology was developed to provide a comprehensive approach for characterizing wetland resources, as required by the Section 404 permitting process. The methodology is equally useful in assessing the functions and values of wetlands as described in the Massachusetts Wetlands Protection Act and for baseline data collection, planning, and assessment purposes.

As stated in the *“Wetland Functions and Values – A Descriptive Approach”* workbook, the ACOE methodology is designed to be “an approach which includes a qualitative description of the physical characteristics of the wetlands, identifies the functions and values exhibited, and most importantly, the basis for the conclusions using “best professional judgment.” Field data and a variety of other types of available data (i.e. GIS datalayers, NRCS soil maps, etc.) are used for evaluation and qualitative assessment of the following functions and values for each wetland replication area:

- Groundwater Recharge/Discharge
- Floodflow Alteration (Storage and Desynchronization)
- Fish and Shellfish Habitat
- Sediment/Toxicant/Pathogen Retention
- Nutrient Removal/Retention/Transformation
- Production Export (Nutrient)
- Sediment/Shoreline Stabilization
- Wildlife Habitat
- Recreation (Consumptive vs. Non-consumptive)
- Educational/Scientific Value
- Uniqueness/Heritage
- Visual Quality/Aesthetics
- Threatened or Endangered Species Habitat



Muskrat
(*Ondatra zibethica*)

The assessment of each wetland replication was based on a review of specific considerations and qualifiers for each of the functions and values listed above (see attached lists of Considerations/Qualifiers in Appendix B).



SECTION 3: WETLAND REPLICATION ASSESSMENTS

As described in Section 2.1, twelve wetland replication projects (comprising fourteen replication areas) permitted in Franklin between 1987 and 1998 were selected for a comprehensive assessment. A list of these sites is provided below in Table 1. The replication sites ranged in approved size from 250 square feet to 14,945 square feet, with an average size of roughly 4,500 square feet. One of the selected sites (site #11) involved three distinct replication areas that were evaluated separately.

Figure 1 provides an overview of the replication site locations. The pages that follow provide a summary assessment of each wetland replication and an associated GIS map. Field data sheets and wetland functions and values assessment sheets related to each assessment are provided as Appendices A and B respectively. Section 4 provides an overall analysis of the sites involved in the study, and related recommendations. A summary analysis of all fourteen wetland replication sites is provided in Table 2 on page 37 of this report.

Table 1: Wetland Replication Assessment Sites

Wetland Replication #	Location	Year Permitted	Approved Size (square feet)	DEP File #
1	Pleasant View Estates, Pleasant Street	1987	4,500	159-169
2	585 Union Street	1989	1,621	159-266
3	420 Lincoln street	1991	6,000	159-275
4	JoAnne Estates (off Washington Street)	1994	13,100	159-359
5	628 Washington Street	1994	1,170	159-409
6	Acorn Woods II (off Acorn Place)	1995	7,700	159-436
7	85 Highland street	1995	3,000	159-445
8	Paddock Lane	1995	4,960	159-458
9	Partridge Woods II (off Tanglewood Drive)	1999	14,945	159-536
10	7 Oak Tree Lane	1996	1,500	159-509
11-a	off Pond Street	1997	1,600	159-586
11-b	off Pond Street	1997	1,000	159-586
11-c	off Pond Street	1997	2,900	159-586
12	783 West Central Street	1998	350	159-594



INSERT FIGURE 1 - OVERVIEW MAP OF REPLICATION SITES



WETLAND REPLICATION #1: Pleasant View Estates, Pleasant Street
Year Permitted: 1987
Approved Size: 4,500 square feet **Estimated Actual Size:** 2,015 square feet
DEP File #: 159-169

Summary of Design Specifications / Approved Replication Plan:

- Only wetland replication size and location were specified in the approved Order of Conditions and supporting documents provided by Franklin Conservation Commission.

Replication Constructed in Substantial Compliance with the Approved Plan?

No. It appears that less than half of the proposed area was actually constructed, and the constructed area does not meet the regulatory definition of a wetland.

Summary of Existing Conditions in Replication Area:

This wetland replication area appears to have been undersized by over 50% based on the approved design plan and observations that the remaining design location was never cleared. Site grading on average appears to be slightly higher in elevation than the adjacent wetland, contributing to inadequate wetland hydrology. The replication area's vegetative community does not exhibit wetland characteristics. The dominant species within the replication were Concord Grape (FACU) and Sassafras (FACU-) with scarce (less than 5 percent) amounts of Canada Golden Rod, Red Maple and Raspberry in the herbaceous layer. The replication area soils do not exhibit hydric characteristics and refusal was consistently reached at around 14 inches. The slopes bordering the replication are dominated by the invasive Japanese Knotweed. However, Japanese Knotweed was scarce within the replication area.

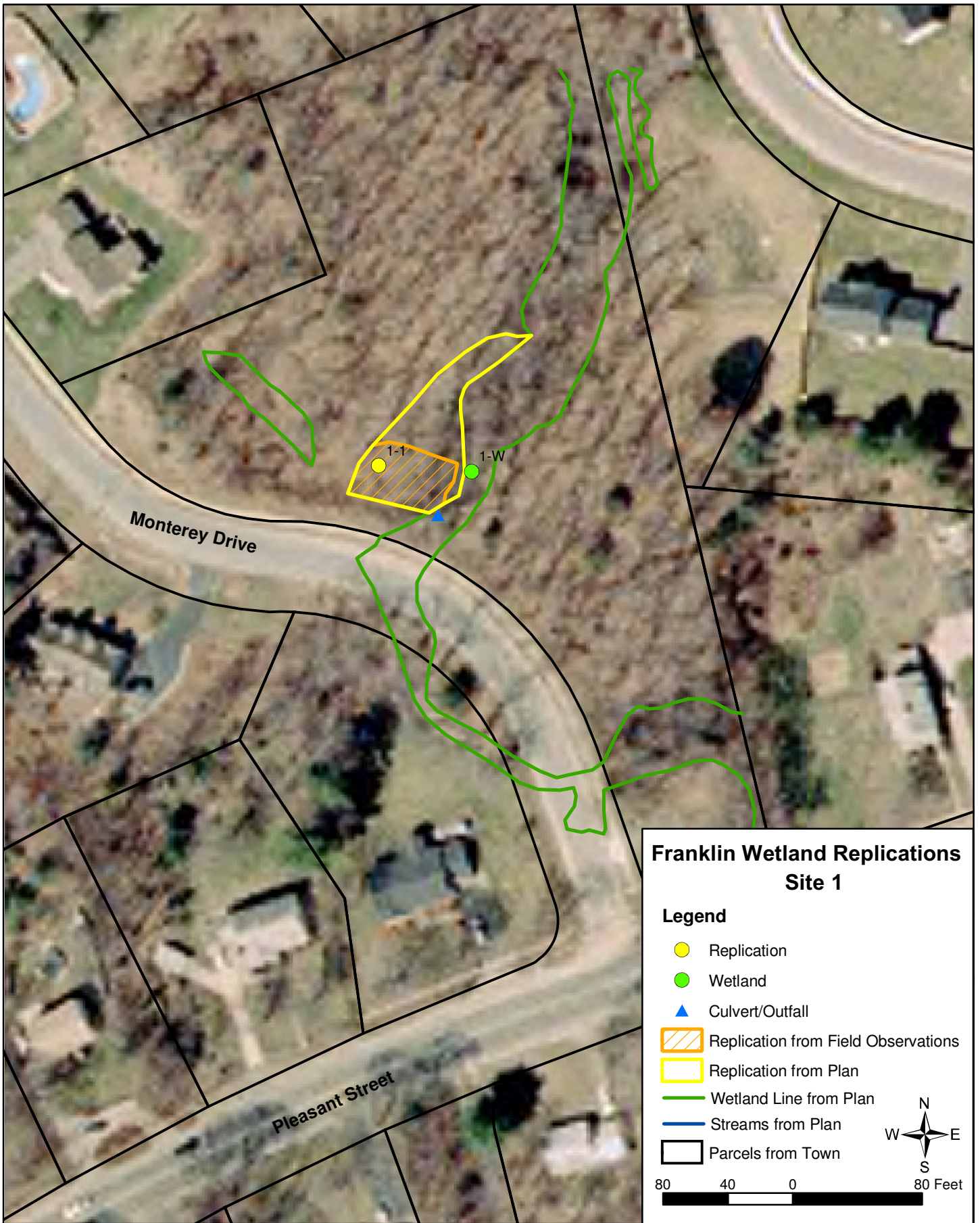
The adjacent wetland community is a forested (predominantly Red Maple) wetland with a thick shrub layer dominated by Northern Arrowwood.



View of replication area monitoring plot, dominated by Concord Grape.



Adjacent wetland monitoring plot 1-w, dominated by Red Maple and Northern Arrowwood.



Franklin Wetland Replications Site 1

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

80 40 0 80 Feet



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FIGURE 1

PROJECT BW0007

DATE 1/30/03

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WETLAND REPLICATION #2: 585 Union Street
Year Permitted: 1989
Approved Size: 1,621 square feet **Estimated Actual size:** 0 square feet
DEP File #: 159-266

Summary of Design Specifications / Approved Replication Plan:

- The wetland replication was to be constructed immediately to the west of a parking area, adjacent to an existing wet meadow.
- The approved plan specified a wetland seed mixture with two species (Reed Canary Grass @ 20 lbs. per acre, Ladino White Clover @ 1 lb. per acre).
- Soils from disturbed wetlands were to be re-used in the replication.
- Finished grade elevations of the replication area required to be “as close as possible” to the adjacent wetlands.

Replication Constructed in Substantial Compliance with the Approved Plan?

No. It appears that the replication area was never constructed.

Summary of Existing Conditions in Replication Area:

The permitted replication area is dominated by dense growth of mature Staghorn Sumac. Other common species include Wild Raisin, Concord Grape and Virginia Creeper. The area is noticeably upgradient from the adjacent wet meadow area to the west. There is no evidence that the area was ever cleared, graded and seeded with a wetland seed mixture according to the approved plan. The two wetland seed mixture species specified in approved plan were not identified in the replication area.

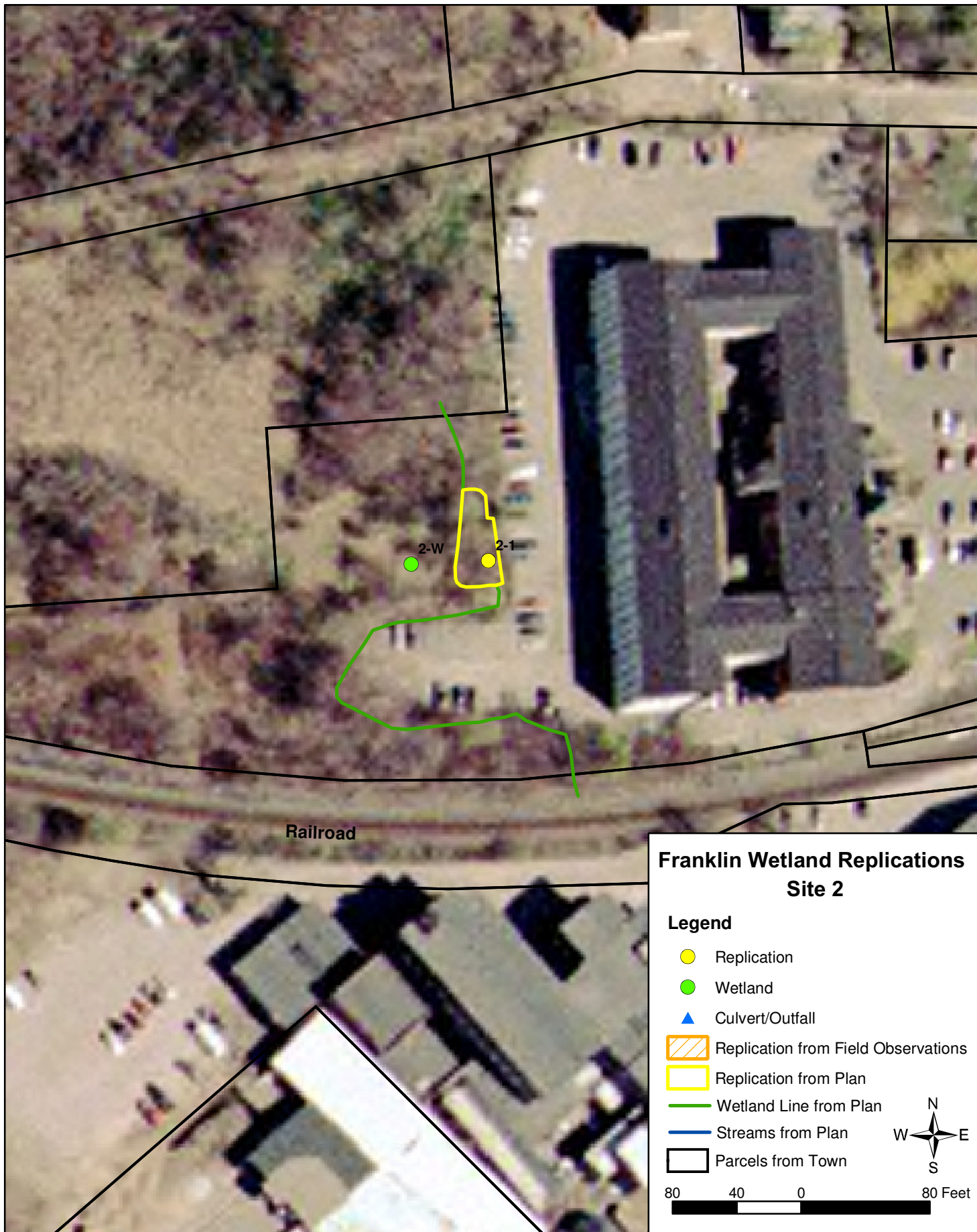
The adjacent wet meadow is dominated by Small Reed Grass and several other herbaceous species such as Broad-leaf Cattail, Skunk Cabbage and Virginia Creeper.



View of approved replication area



View of adjacent wet meadow monitoring plot 2-w, looking towards approved replication area.



Franklin Wetland Replications Site 2

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet



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FIGURE	2
PROJECT	BW0007
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WETLAND REPLICATION #3: 420 Lincoln Street (south of Bridle Path Road)
Year Permitted: 1991
Approved Size: 6,000 square feet **Estimated Actual Size:** 5,826 square feet
DEP File #: 159-275

Summary of Design Specifications / Approved Replication Plan:

- Detailed planting plan, including planting densities for ten wetland species in three vegetation layers (herb, shrub swamp and tree canopy).
- Replication area to be excavated to 6" below adjacent wetland, and backfilled with loam or other organic materials. To the extent possible, original wetland soils from disturbed area to be used for backfilling replication.
- Replication to have unrestricted hydraulic connection to adjacent wetland.
- Plants from disturbed wetland area to be transplanted to wetland replication area.
- Post-project monitoring required twice per year for two years.

Replication Constructed in Substantial Compliance with the Approved Plan?

Overall, yes. However, the site appears to have been excavated to an elevation significantly lower than the adjacent wetland. No post-project monitoring reports were found in the project file.

Summary of Existing Conditions in Replication Area:

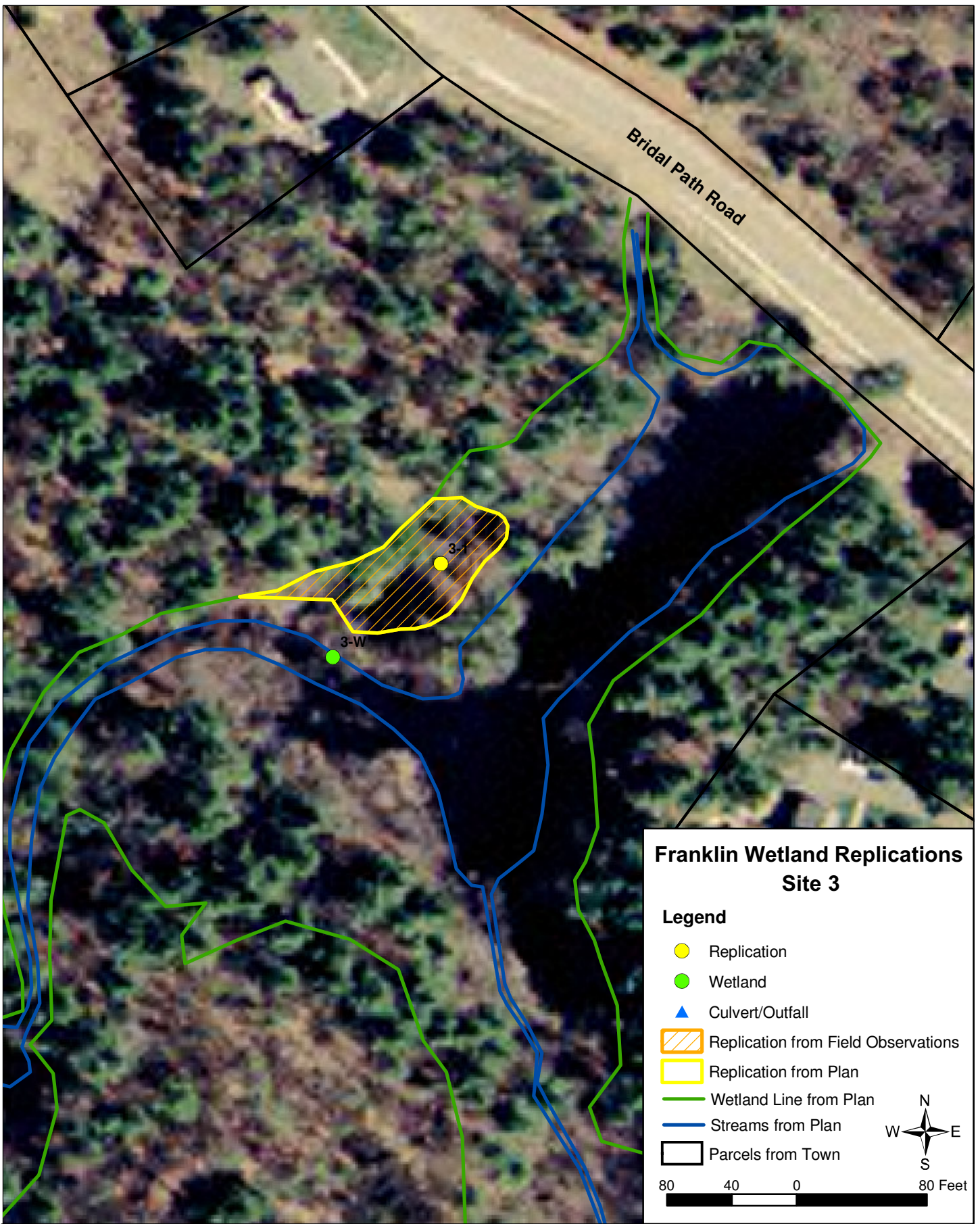
This wetland replication appears to have been well constructed and has ample hydrology to support an emergent wetland community. The replication appears to be functioning very well and is providing excellent wildlife habitat. At the time of inspection, the replication area had 6"-9" of standing water, making it considerably wetter than the adjacent wetland. The replication is dominated by Bur-reed and a variety of other emergent herbaceous species including Narrow-leaved Cattail, Lurid Sedge, Soft Rush, Wool Grass, Three-way Sedge, and Arrowhead. Overall plant densities are moderate, but are expected to increase as the wetland area continues to develop and mature over time. Abundant signs of wildlife use were present, including beaver chewings, muskrat and other mammal paths, and a variety of birds.



Replication area.



Adjacent wetland area.



Franklin Wetland Replications Site 3

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet



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FIGURE	3
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WETLAND REPLICATION #4: JoAnne Estates (off Washington Street)

Year Permitted: 1994

Approved Size: 13,100 square feet (*Note: although stated as 13,100 square feet in the NOI and Site Plan, GeoSyntec calculated the proposed Site Plan area to be 11,416 square feet.*)

Estimated Actual Size: 9,722 square feet

DEP File #: 159-359

Summary of Design Specifications / Approved Replication Plan:

- Replication area to be excavated to 6" below adjacent wetland, and backfilled with hydric peat soils.
- Planting plan specified 25-30 red maple saplings, 50 shrubs and various herbaceous layer plantings.
- Slope stabilization around replication with vegetative matting and rye grass planting.
- Monitoring program specifies inspections 6 months, 1-year and 2-years after planting.

Replication Constructed in Substantial Compliance with the Approved Plan?

No. The site was poorly graded and the replication area is substantially undersized.

Summary of Existing Conditions in Replication Area:

It appears that construction of this replication area did not extend far enough to its approved southern extent, limiting both its size and connection to the adjacent wetland. Overall, the site grading was done poorly and the site is significantly upgradient from the adjacent forested wetland to the southeast. As such, the site hydrology appears to be a limiting factor for the marginal wetland community that has become established. In general, the southeast portion of the site is more successful due to its lower elevation, with more strongly developed hydric soils and a dominant hydric vegetation community including Soft Rush, Spicebush and Elderberry. The northwest end of the site (closer to Washington Street) is upgradient, and has a variety of upland plants such as Staghorn sumac and Concord grape.

The adjacent forested wetland overstory includes Red maple, River Birch and Ash. The diverse understory includes wetland shrub and herbaceous species including Northern Arrowwood, Poison Sumac, Sensitive Fern, Jewelweed, Skunk Cabbage, and Burr-reed. This wetland also exhibits deep, mucky organic soils.



Replication area.



Adjacent wetland area.



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FIGURE	4
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WETLAND REPLICATION #5: 628 Washington Street (Remington Jefferson School)
Year Permitted: 1994
Approved Size: 1170 square feet
DEP File #: 159-409
Estimated Constructed Size: 1170 square feet
***Current Size:** 391 square feet (see below)

Summary of Design Specifications / Approved Replication Plan:

- Planting plan specifying location and quantity of four tree and shrub species as well as locations of “typical hummock clusters”.
- Topsoil/organic material for replication to be taken from disturbed on-site wetlands.
- Grading designed so that shrubs are planted approximately 1-2 feet “above the surrounding water level”.
- Monitoring required twice per year for two years. If 75% establishment success of planted species is not achieved after two years, full replacement planting required.

Replication Constructed in Substantial Compliance with the Approved Plan?

Yes, although the site does not appear to support its intended function as a vernal pool.

Summary of Existing Conditions in Replication Area:

This vernal pool replication area appears to have been constructed in compliance with the size, location, grading and planting specifications of the approved plan. However, the area does not appear to exhibit vernal pool features and is not likely to provide the specialized habitat of a vernal pool. The replication area is a narrow, channel-like depression that more closely resembles a vegetated roadside ditch. The hydrology, size and water-holding capacity of this area make it unlikely that it would seasonally hold water to the extent required of a certifiable vernal pool. The vegetation community is dominated by wetland species, including those specified in the planting plan (Highbush Blueberry, Sweet Pepperbush, Red Maple) and a variety of grasses and sedges such as Wool Grass, Lurid Sedge and Fringed Sedge.

As shown in the photograph below, 67% of this replication area was recently filled in to create a construction access roadway for a project on an adjacent parcel.



View of current vernal pool replication areas and recently filled access road.



Franklin Wetland Replications Site 5

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet



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FIGURE	5
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WETLAND REPLICATION #6: Acorn Woods II (off Acorn Place)

Year Permitted: 1995

Approved Size: 7,700 square feet **Estimated Actual Size:** 3,916 square feet

DEP File #: 159-436

Summary of Design Specifications / Approved Replication Plan:

- Replication area to be excavated to 6" below finished grade, and backfilled with hydric soils from on-site disturbed wetlands or peat from off site. Soils to be covered with leaves or mulch to retain moisture.
- Planting plan including hand planting of a tree layer (12 Red Maple saplings), shrub layer (Sweet Pepperbush, Highbush Blueberry), and ground layer (6 species).

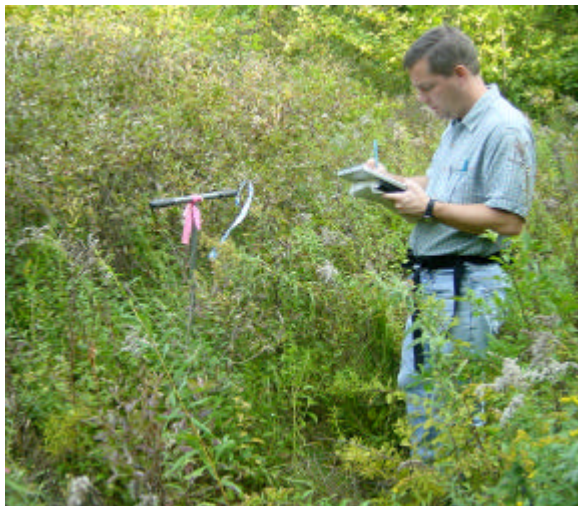
Replication Constructed in Substantial Compliance with the Approved Plan?

No, the site appears to be substantially undersized.

Summary of Existing Conditions in Replication Area:

The replication area appears to have been constructed at approximately 50% of its approved size. Soil profiles from the replication area and adjacent wetland were quite similar. However, the adjacent wetland (which is situated downgradient from the replication) had a greater presence of redoximorphic features within the B soil layer, indicating that site grading did not adequately match the replication area's groundwater hydrology to that of the adjacent wetland.

Site grading with the replication was noticeably uneven, with lower elevations (and 'wetter' conditions) found adjacent to the natural wetland boundary. Overall, the constructed portion of the site exhibits a predominantly wetland shrub/herbaceous community with a limited presence of transitional species such as Quaking Aspen and White Pine. Abundant and common species within this area included Canada Goldenrod, Red Osier Dogwood, Broad-leaf Meadowsweet, Broom Sedge, and Poison Ivy. The portion of the replication area that was not constructed is comprised of a cart path and a mowed turf grass area.



Replication Area Monitoring Plot 6-1.



Adjacent Wetland Area Monitoring Plot 6-w.



Franklin Wetland Replications Site 6

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet



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FIGURE	6
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WETLAND REPLICATION #7: 85 Highland Street

Year Permitted: 1995

Approved Size: 3,000 square feet **Estimated Actual Size:** 2,993 square feet

DEP File #: 159-445

Summary of Design Specifications / Approved Replication Plan:

- Top 12 inches of hydric soil to be stripped from wetland impact area for use in replication. Any additional required topsoil will be a mix of 2 parts peat to 3 parts loam.
- Replication topsoil shall be placed in a minimum of 2 layers, to 4 inches above final grades to allow settling.
- Detailed planting plan specifying quantity and location of six species (1 tree species, 2 shrub species and 3 herbaceous species).
- Monitoring required after 1 full growing season, with replacement planting of areas with less than 75% survival of planted species.

Replication Constructed in Substantial Compliance with the Approved Plan? Yes.

Summary of Existing Conditions in Replication Area:

This wetland replication exhibits a diverse and vigorous wetland shrub/herbaceous community, and appears to have been properly graded to ensure appropriate hydrology and connection to the adjacent wetland. Based on the planting locations indicated on the Site Plan, a number of the planted tree and shrub saplings appear to have died, although overall plant density (including “self-selected” wetland species) is quite good. Tree saplings within the area included common growth of Speckled Alder, and a limited presence of other species including Red Maple, Quaking Aspen, and American Elm. Shrub and herb species are too numerous to list, with abundant growth of Tussock Sedge, and the invasive Purple Loosestrife. Other common plants included Northern Arrowwood, Virginia Creeper, Arrowleaf Tearthumb, Jewelweed, and Common Reed. Soils within the replication had well-developed hydric soil characteristics, with a very dark, mucky A layer and significant redoximorphic features within the top seven inches.

The adjacent wetland was slightly lower and wetter than the replication, but exhibited many of the same wetland plant species found in the replication.



View of replication area from Highland Street.



Adjacent wetland Monitoring Plot 7-w.



Franklin Wetland Replications Site 7

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet



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FIGURE	7
PROJECT	BW0007
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WETLAND REPLICATION #8: Paddock Lane (Dover Farms Subdivision)

Year Permitted: 1995

Approved Size: 4,960 square feet **Estimated Actual Size:** 4,560 square feet

DEP File #: 159-458

Summary of Design Specifications / Approved Replication Plan:

- Topsoil from filled wetland or a 50% peat / 50% sand mixture to be used as topsoil for replication.
- Grading shall incorporate topographic variations, slopes and drainage pattern to match those of the impacted filled wetland.
- Planting plan involves transplantation of shrubs from the impacted wetland (plus herbaceous seed bank in transplanted soils), and/or nursery transplants and wetland seed mixture.
- Monitor after first year of growth. Areas of high shrub mortality “should be transplanted”.

Replication Constructed in Substantial Compliance with the Approved Plan? No. Site grading clearly does not match that of the “filled wetland” or adjacent wetland, as required.

Summary of Existing Conditions in Replication Area:

This replication area is functioning only marginally well as a wetland due to inadequate grading, which limits its supporting hydrology. Indicative of the site’s marginal wetland status is the presence of transitional species in the tree, sapling and shrub layers, such as Eastern Cottonwood, Grey Birch, Quaking Aspen Red Oak, Witch Hazel, and White Pine. However, the herb layer was dominated by hydrophytic vegetation including Cinnamon Fern, Highbush Blueberry, and Tussock Sedge. By comparing the overall wetland community with that of the adjacent wetland, it appears as though grading to a slightly lower elevation would have yielded a more predominantly wetland vegetation community and increased wetland functions.

The adjacent forested wetland was dominated by Red Maple and White Oak in the overstory, with Sweet Pepperbush and Wild Raisin in the Shrub layer and a variety of wetland species in the herb layer.



Replication monitoring plot 8-1.



Adjacent wetland monitoring plot 8-w.



Franklin Wetland Replications Site 8

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet

FIGURE	8
PROJECT	BW0007
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WETLAND REPLICATION #9: Partridge Woods II (off Tanglewood Drive)
Year Permitted: 1999
Approved Size: 14,945 **Estimated Actual Size:** 10,437 square feet
DEP File #: 159-536

Summary of Design Specifications / Approved Replication Plan:

- Excavate to one foot below final grade and replace topsoil with “mature dark brown loam or a mix of 50% peat and 50% sand by volume”.
- *Recommend* broadcast of wetland seed mixture to provide herbaceous diversity.
- Shrub planting plan specifies 1 shrub per 64 square feet, including Yellow Birch, Red Maples, Arrowwood, Highbush Blueberries, and Winterberries.
- Inspection after first full year of growth, replacement of dead shrubs. Two years of monitoring with report to Conservation Commission at end of each growing season.

Replication Constructed in Substantial Compliance with the Approved Plan? No. The replication appears to be functioning well but is only 70% of its approved size.

Summary of Existing Conditions in Replication Area:

Despite being undersized by roughly 4,500 square feet, this replication area appears to be functioning well as a predominantly herbaceous wet meadow. Twenty-four healthy Red maple saplings (and one dead sapling) were counted within the replication area, as well as lesser number of River Birch, Arrowwood, Grey Birch and Speckled Alder. The diverse herb layer within the monitoring plot was dominated by Soft Rush, Wool Grass, Tussock Sedge, and Blue Vervain. Other common species outside of the plot included New York Ironweed, Sensitive Fern, Lurid Sedge and Joe-Pye Weed. The replication also exhibited well-developed hydric soils, with significant redoximorphic features within the top six inches of the A layer.

The adjacent wetland area monitoring plot was comprised of many of the same wetland herbaceous species found in the replication, and was dominated by species including Soft Rush, Broad-leaf Cattail, New York Aster, and Square-stemmed Monkeyflower.



View of replication area from access roadway off of Tanglewood Drive.



Adjacent wetland area.



Franklin Wetland Replications Site 9

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet

FIGURE	9
PROJECT	BW0007
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WETLAND REPLICATION #10: 7 Oak Tree lane

Year Permitted: 1996

Approved Size: 1,500 square feet **Estimated Actual Size:** 0 square feet

DEP File #: 159-509

Summary of Design Specifications / Approved Replication Plan:

Transplant shrubs and plants from filled area to replication area. Shrubs: Highbush blueberry and swamp azalea, 8 ' apart. Plants: skunk cabbage, sensitive fern, cinnamon fern, and sphagnum moss.

Excavate to approx. 2 feet below proposed final grade. Replace topsoil with that of filled wetland or 50/50 mix of peat and sand.

Grade/shape wetland for adequate slope and proper drainage, similar to that of the adjacent wetlands.

Replication Constructed in Substantial Compliance with the Approved Plan? No.

Summary of Existing Conditions in Replication Area:

It appears that this wetland replication was never constructed. The project associated with the replication area involved filling wetlands and installing a 16-inch pipe to replace a section of drainage channel. The replicated wetland was to be constructed roughly parallel to the western edge of the property at 7 Oak Tree Lane (off-set approximately 15 feet from the property boundary). Field measurements from the wetland boundary (original flags were observed) revealed that the approved replication area is currently forested with medium diameter trees, having never been cleared, graded, or planted to replicate wetland conditions.

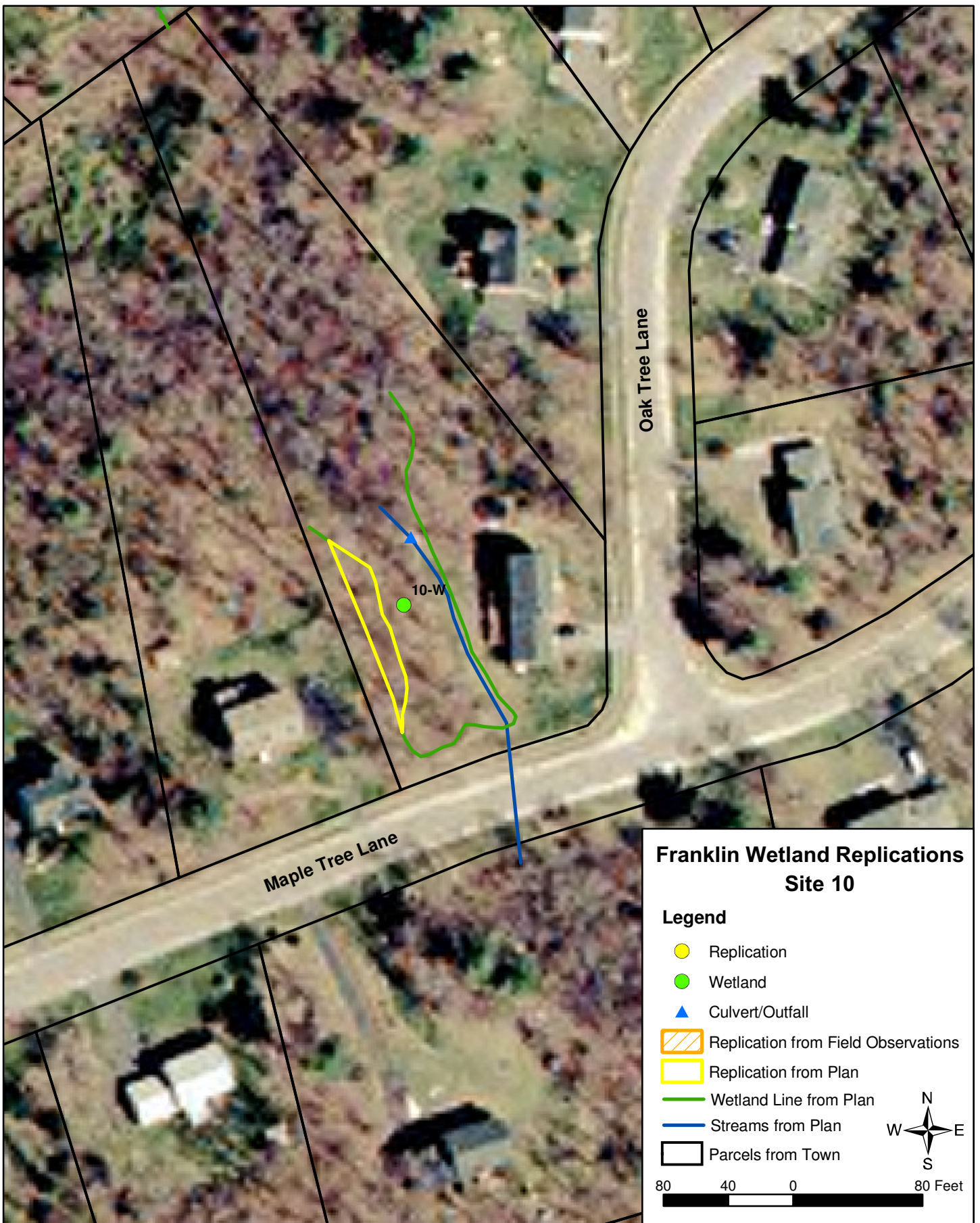
A review of the adjacent wetland indicated that this area has, at best, a marginal wetland community. It seems possible that some of the hydrology previously supporting a wetland vegetation community in this area may have been diverted due to the piping of the drainage ditch. The area's overstory is dominated by a mix of Red Maple (FAC) and Red Oak (FACU-), with a transitional understory of Sweet Pepperbush (FAC+), Witch Hazel (FAC-), Wild Raisin (FACW), and Common Greenbrier (FAC).



Approved wetland replication area.



Adjacent wetland monitoring plot 10-w.



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WETLAND REPLICATION #11-A: off Pond Street (MHD road improvement project)
Year Permitted: 1997
Approved Size: 1,600 square feet **Estimated Actual Size:** approx. 1,600 square feet
DEP File #: 159-586

Summary of Design Specifications / Approved Replication Plan:

- Planting plan indicated location and quantity of shrub plantings, including 18 Highbush Blueberry, 5 Northern Arrowwood, and 7 Red Maple.
- Wetland soil to be 12 inches of hydric soil or 6 inches of hydric soil over a 1:1 ratio of loam and peat. To extent possible, use wetland soils from filled wetland areas.
- Seed basin with perennial Ryegrass (80%) and White Clover (20%) mixture and apply water soluble, quick-release fertilizer.
- Monitoring inspections and report at the end of the 1st and 2nd growing seasons (October). Replace dead nursery stock and re-seed areas with less than 50% cover.

Replication Constructed in Substantial Compliance with the Approved Plan?

Yes, although a majority of planted shrubs are dead or missing.

Summary of Existing Conditions in Replication Area:

This replication area seems to be thriving as an intermittently flooded wet meadow community. At the time of the site inspection, most of the 30 shrubs specified in the planting plan were either found dead or absent from the replication area. Two Red Maples and Two Highbush Blueberry plantings were still alive. It is possible that the shrub plantings did not survive because the site is too wet for these species to thrive. Regardless, this replication can certainly be considered a success based on the health and vigor of its wetland herbaceous community, the habitat it provides, and its flood storage functions. The site exhibits well-developed hydric soils, with significant redoximorphic features within the top 12 inches (see photo below). Common plants include Canada rush, Soft Rush, Spike Rush, and Pennsylvania Smartweed.



Replication monitoring plot 11A-1, exhibiting strongly developed hydric soils.



Adjacent wetland monitoring plot area, showing Eastern Burning Bush.



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FIGURE	11
PROJECT	BW0007
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WETLAND REPLICATION #11-B: off Pond Street (MHD road improvement project)
Year Permitted: 1997
Approved Size: 1,000 square feet **Estimated Actual Size:** approx. 1,000 square feet
DEP File #: 159-586

Summary of Design Specifications / Approved Replication Plan:

- Planting plan indicated location and quantity of shrub plantings, including 14 Highbush Blueberry, 5 Northern Arrowwood, and 5 Red Maple.
- Wetland soil to be 12 inches of hydric soil or 6 inches of hydric soil over a 1:1 ratio of loam and peat.
- Seed basin with perennial Ryegrass (80%) and White Clover (20%) mixture and apply water soluble, quick-release fertilizer.
- Monitoring inspections and report at the end of the 1st and 2nd growing seasons (October). Replace dead nursery stock and re-seed areas with less than 50% cover.

Replication Constructed in Substantial Compliance with the Approved Plan? Yes.

Summary of Existing Conditions in Replication Area:

This replication area appears to be thriving, as is particularly notable for the survival rate and vigor of its planted trees and shrubs. Based on a comparison of site conditions with the approved planting plan, it appears that all of the planted shrubs/trees are alive and well established, as seen in the photo below. As expected from the planting plan, saplings and shrubs at the site include Red Maple, Highbush Blueberry, and Northern Arrowwood. The herbaceous community is dominated by one wetland species (Soft Rush, FACW+) and one facultative upland species (Autumn Bent Grass, FACU). Swamp Buttercup is also common. Hydric soils are present at the site.

The adjacent wetland monitoring plot area is a sparsely forested area located downgradient from the replication, with Red Maple dominating the overstory and Tussock Sedge dominating the understory



Replication area 11-B. Planted trees and shrubs appear to be thriving.



Adjacent wetland monitoring plot 11B-w.



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FIGURE	11
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WETLAND REPLICATION #11-C: off Pond Street ((MHD road improvement project)
Year Permitted: 1997
Approved Size: 2,900 square feet **Estimated Actual Size:** approx. 2,900 square feet
DEP File #: 159-586

Summary of Design Specifications / Approved Replication Plan:

- Planting plan indicated location and quantity of shrub plantings, including 35 Highbush Blueberry, 20 Northern Arrowwood, and 20 Red Maple.
- Wetland soil to be 12 inches of hydric soil or 6 inches of hydric soil over a 1:1 ratio of loam and peat.
- Seed basin with perennial Ryegrass (80%) and White Clover (20%) mixture and apply water soluble, quick-release fertilizer.
- Monitoring inspections and report at the end of the 1st and 2nd growing seasons (October). Replace dead nursery stock and re-seed areas with less than 50% cover.

Replication Constructed in Substantial Compliance with the Approved Plan? Yes.

Summary of Existing Conditions in Replication Area:

This outstanding replication area provides excellent wildlife habitat and flood storage functions. Most of the area hosts a diverse and thriving emergent herbaceous wetland community, with some areas that appear to be permanently flooded. Similar to site 11-A, a significant percentage of the 75 planted shrubs/trees indicated on the planting plan appear to have failed, possibly due to conditions being too wet for their survival. However, sixteen herbaceous wetland species were found growing densely in the area around the monitoring plot, including Wool Grass, Soft Rush, Water Starwort, Marsh Seedbox, Pennsylvania Smartweed, and Swamp Loosestrife.

The replication area is contiguous with a flood plain wetland adjacent to Mine Brook (just prior to its confluence with the Charles River). This herbaceous/shrub community is dominated by Fringed Sedge and the invasive Purple Loosestrife, with species including Red Maple, Wild Raisin and Buttonbush in the Tree and Shrub layers. Although Purple Loosestrife was not found within the replication monitoring area, the proximity of this aggressive species in the adjacent wetland poses a threat to future species diversity within the replication.



Replication area 11-C.



Adjacent wetland monitoring plot 11C-w.



Franklin Wetland Replications Site 11c

Legend

- Replication
 - Wetland
 - ▲ Culvert/Outfall
 - Replication from Field Observations
 - Replication from Plan
 - Wetland Line from Plan
 - Streams from Plan
 - Parcels from Town
-
-



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FIGURE	11c
PROJECT	BW0007
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WETLAND RESTORATION #12: 783 West Central Street
Year Permitted: 1998
Approved Size: 350 square feet **Estimated Actual Size:** 350 square feet
DEP File #: 159-594

Summary of Design Specifications / Approved Restoration Plan:

- Remove soil over restoration area to grade of original wetland soils. Final 12 inches of soil removal shall be done with hand tools to avoid disturbing wetland soils.
- If required, additional topsoil shall be a mix of loam with peat at 3:2 ratio by volume. This soil shall be mixed into natural wetland soils with hand tools to match original grade.
- The wetland restoration area shall be planted with a combination of seeds such as Switchgrass (*Panicum virgatum*) and plants such as Sedge (*Carex spp.*), with seeding between April 1 and May 15 or September 5 and October 15.
- Monitor after one full growing season. Replant areas with less than 75% plant coverage.

Restoration Constructed in Substantial Compliance with the Approved Plan?

Yes, although grading to a slightly lower elevation would have improved site hydrology and function.

Summary of Existing Conditions in Restoration Area:

This site is a small wetland restoration area that was constructed by removing improperly placed fill material and replanting with wetland species. Overall, the restoration area appears to have been constructed properly, although it was graded to a slightly higher elevation than that of the adjacent wetland. As a result of this higher elevation, the common plants within the herbaceous community are more characteristic of a transitional wetland. Common plants included Canada Goldenrod (FACU), Wrinkled Goldenrod (FAC), New York Ironweed (FACW) and Fragrant Goldenrod (FAC) and Common Sneezeweed (FACW+).

The adjacent wetland monitoring plot was heavily dominated by Calico Aster (FACW-), with a lesser presence of Sedges (*Carex spp.*), Water Smartweed and Virginia Creeper.



Replication monitoring plot 12-1.



Adjacent wetland monitoring plot 12-w.



Franklin Wetland Replications Site 12

Legend

- Replication
- Wetland
- ▲ Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town



80 40 0 80 Feet



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FIGURE	12
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SECTION 4: ANALYSIS AND RECOMMENDATIONS

Results! Why, man, I have gotten a lot of results. I know several thousand things that won't work.

Thomas Edison

4.1 Wetland Replication Analysis Summary

As described in Section 3, a total of twelve projects comprising fourteen replication areas were assessed as part of this project. Table 2 on the following page provides a summary overview assessment of these replication areas. Although the relatively small number of sites involved in this study limits the ability to draw broad or statistically significant conclusions about the regulatory compliance of wetland replications in general, the overall results draw attention to several important points:

- In total, the fourteen sites were required to replicate 64,346 square feet of wetland. The total area of wetland replication actually constructed (minus the area of Site #1, which did not develop wetland characteristics) was 43,695 square feet. For the fourteen sites, this equals a net loss of 20,651 square feet of wetland, roughly one-third (32%) of the required replication area.
- Only half (7) of the fourteen sites were determined to be constructed in substantial compliance with the approved replication plan. These sites included the following:
 - Site #3 appears to be thriving and offers excellent wildlife habitat and flood storage functions. However, it is worth noting that most of this successful site was graded substantially (6-9 inches) lower than the adjacent wetland.
 - Site #5 appears to have been built to specification, but 70% of its area was recently filled as part of a development project on an adjacent parcel. Despite apparently being built according to plan, this site does provide its intended function as vernal pool habitat.
- Of the seven sites that were determined to be sub-standard:
 - Four sites exhibited wetland characteristics (dominant wetland vegetation and hydric soils) but did not comply with the approved plan due to being significantly undersized, having inadequate grading, or both. "Undersized" replications were defined as sites which were less than 90% of their approved size. One of the undersized sites (Site 9) had one of the most diverse and vigorous wetland herbaceous communities of the sample set.
 - Two of the replication areas (Sites #2 and #10) were never built.
 - Site #1 was undersized and failed to develop wetland features due to poor grading and lack of sufficient hydrology.
- Overall, the "success" rate and functional performance of the wetland replication assessments for this study were generally consistent with a statewide study published in



Table 2: Wetland Replication Assessment Summary Table

Site #	Year Permitted	Approved Size (sf)	Estimated Constructed Size (sf)	% of Approved Size (sf)	Is Replication a Wetland?	Does Replication Substantially Comply with Approved Plan?	Comments
1	1987	4,500	2,015	45%	No	No	Undersized, poor grading and hydrology, lacking hydric soils and dominant wetland plants
2	1989	1,621	0	0%	No	No	Replication area not built.
3	1991	6,000	5,826	97%	Yes	Yes	Excellent habitat and flood storage. Excavated to lower elevation than immediately adjacent wetland.
4	1994	13,100	9,722	74%	Yes	No	Poor grading, undersized.
5	1994	1,170	391*	33%	Yes	Yes*	Construction appears to comply, but 67% of area has since been filled. <i>Does not</i> support intended vernal pool function
6	1995	7,700	3,916	51%	Yes	No	Substantially undersized.
7	1995	3,000	2,993	99.8%	Yes	Yes	Diverse, dense herbaceous community.
8	1995	4,960	4,560	92%	Yes (marginal)	No	Inadequate grading.
9	1999	14,945	10,437	70%	Yes	No	Undersized, although replication area is thriving.
10	1996	1,500	0	0%	No	No	Replication area not built.
11-a	1997	1,600	1600	100%	Yes	Yes	Thriving wet meadow community. Majority of planted shrubs are dead or missing.
11-b	1997	1,000	1,000	100%	Yes	Yes	Excellent survival of planted trees and shrubs.
11-c	1997	2,900	2,900	100%	Yes	Yes	Excellent wildlife habitat. Many tree/shrub plantings failed due to conditions being too wet.
12	1998	350	350	100%	Yes	Yes	Transitional wetland community ...lower elevation would have improved hydrology/function.
Total Area of Approved Wetland Replication: 64,346 sf Total Area of Wetland Replication Constructed: 45,710 sf (71% of approved area) Total Area of Wetland Successfully Replicated: 43,695 sf (68% of approved area) Overall "Success" Rate (replication complies substantially with approved plan): 50% (7 of 14 replications) * <i>* Wetland #5 appears to have been built according to plan, but has since been filled / altered.</i>							



1998 by the University of Massachusetts (Brown and Veneman, *Compensatory Wetland Mitigation in Massachusetts*,) and other similar studies. The UMass study assessed 114 wetland replication sites and found that just over half of all sites (54%) were not in regulatory compliance for a variety of reasons, including no attempt to build the project, insufficient size or hydrology, or insufficient cover of wetland plants.

The following Sections 4.2 to 4.4 provide a more detailed discussion of the wetland replications with regard to (1) site grading and hydrology, (2) establishment of wetland vegetation, and (3) wetland functions and values. Recommendations for future wetland replication design, permitting, construction and monitoring are provided in Section 4.5.

4.2 Wetland Replication Site Grading / Hydrology

Site grading, and the site assessment and elevation design which precedes it, are perhaps the most critical aspects of any wetland replication project. Site grading will determine if a replication has ample hydrology to sustain a wetland vegetation community and perform fundamental wetland functions such as flood flow alteration. As stated in the Massachusetts Inland Wetland Replication Guidelines, *“Inadequate hydrology is often a result of inadequate evaluation of the replication site before construction, particularly when sites depending on ground water are not excavated deeply enough to provide water in adequate quantity and at appropriate seasons.”*

A summary of permit requirements for the replication areas and a general assessment of site grading/ hydrology (with respect to these requirements) is provided in the Tables 3 and 4 below:

Table 3: Site Grading/Hydrology Categories

Grading / Hydrology Assessment	# of Sites
Site not built	2
Elevation too high / Site too dry	1
Site undersized	2
Site too dry <u>and</u> undersized	3
Grading in general compliance with permit	6



Table 4: Replication Grading/Hydrology Assessment Summary

Site #	Summary of Permit Specifications Related to Grading / Hydrology	Summary Assessment of Site Grading / Hydrology
1	Only wetland replication size and location specified.	Undersized, poor grading and hydrology.
2	Finished grade of the replication to be as close as possible to the adjacent wetlands.	Replication area not built.
3	Excavate to 6" below adjacent wetland and backfill with loam or other organic materials. To extent possible, original wetland soils from disturbed area to be used for backfilling replication. Replication to have unrestricted hydraulic connection to adjacent wetland. The groundwater and surface elevation of the replication shall be approximately equal to that of the lost area.	Excavated 6"-9" lower elevation than immediately adjacent wetland. Ample hydrology for emergent low marsh community and good flood storage function.
4	Excavate to 6" below adjacent wetland, and backfill with hydric peat soils.	Poor grading, undersized. Uneven grading with south side "wetter" than north. Significantly higher elevation than adjacent forested wetland.
5	Areas to be graded "as shown on plans" (design elevation specified)	Construction appears to have complied with plan design elevation.
6	Excavate to 6" below finished grade (shown on plans), and backfill with hydric soils from on-site disturbed wetlands or peat from off site.	Substantially undersized and noticeably uneven grading resulting in marginal wetland community.
7	Top 12" of hydric soil to be stripped from impact area for use in replication. Any additional required topsoil will be a mix of 2 parts peat to 3 parts loam. Topsoil to be placed in a minimum of 2 layers, to 4" above final grades (on plans) to allow for settling.	Site appears to have been well designed and constructed.
8	Grading shall incorporate topographic variations, slopes and drainage pattern to match those of the <i>filled</i> wetland.	Elevation higher than adjacent wetland, and significantly higher than that of the filled area. Overall, inadequate replication of required slopes, topography and drainage.
9	Excavate to one foot below final grade (on plans). Replace topsoil with "mature dark brown loam or a mix of 50% peat and 50% sand by volume".	Undersized, although the properly graded portion (70% of required area) is thriving.
10	Excavate to approx. 2 feet below proposed final grade. Replace topsoil with that of filled wetland or 50/50 mix of peat and sand. Grade/shape wetland for adequate slope and proper drainage, similar to that of the adjacent wetlands.	Replication area not built.
11-a 11-b 11-c	Excavate replication area floor to 12" below finished grade (on plans) and side slopes to 6" below. Spread 6" of loam on replication floor and spread wetland topsoil to establish final grade. Final grade shall be "compatible" with and shall provide hydrologic connection to adjacent wetland elevations. * Design elevations incorporate required compensatory flood storage.	These sites appear to comply with permit design requirements. Sites 11-a and 11-c are graded lower than the immediately adjacent wetlands (to achieve required flood storage volumes), but are consistent with other areas of the wetland to which they have a direct hydrologic connection.
12	Soil over replication to be removed by machine to a depth not less than 12" above original grade. Final 12 inches to be removed with hand tools after ground has thawed.	In compliance...slightly lower elevation would have improved hydrology / function.



Since topographic surveys were not part of this project's scope of work, GeoSyntec's assessment of grading compliance was based on field observation of the replication area and adjacent wetland, and comparison of the replication area's current surface area (field-delineated and located with a GPS unit) with the proposed site plan. Although Site #3 was determined to be graded to an elevation 6-9 inches *lower* than specified (in relation to the immediately adjacent wetland area), we consider this site to be in general compliance with permit specifications because (1) this lower grading was consistent with other portions of the same wetland to which the replication has unrestricted hydraulic connection, and (2) the replication area exhibits a thriving wetland herbaceous community and excellent wetland functions.

4.3 Wetland Replication Vegetation / Plantings

The Massachusetts Wetlands Protection Act regulations at 310 CMR 10.55 require that wetland replication areas must have at least 75% cover of native wetland plants within two growing seasons. Even at the sites where final elevations and grading appeared to be inadequate in reference to permit specifications, most of the constructed replication sites developed a vegetation community that was dominated by wetland plants (FAC or wetter, as defined by the Massachusetts Wetlands Protection Act). In fact, only one of the fourteen constructed wetland replication areas failed to develop a wetland plant community, although several of these were quite marginal and dominated by transitional wetland species as a result of grading problems.

Surprisingly, non-native invasive species were generally quite scarce at the replication sites and were notable at only two of the sites. The replication monitoring plot at Site #7 had "abundant" (26-50%) coverage of Purple Loosestrife, although overall native wetland plant coverage for the entire site exceeded the 75% regulatory criteria and the diversity of vegetation (28 species) growing on the site was excellent. Site #11-c had "common" (6-25%) coverage of Purple Loosestrife, but also exhibited a vigorous and diverse herbaceous community (17 species) that exceeded the 75% native wetland species requirement. It is worth noting that the wetland adjacent to replication #11-c had abundant Purple Loosestrife which may contribute to the increased spread and dominance of this plant within the replication area in years to come.

As further described in Table 5 on the following page, the planting plans for the fourteen replication sites can be categorized as follows:

Eleven of the sites had planting plans that included including specifications for species, quantity and location (or planting density) of planted trees and shrubs.

Two of the sites specified the use of a seed mixture and re-use of seed stock from disturbed wetland soils.

For one site, only the replication area size and location were specified in the permit and plan documents available from the Franklin Conservation commission files.

4.4 Monitoring Protocols and Construction Corrections

No records or reports related to post-construction wetland replication monitoring (a permit requirement for most of the projects) were found in the project files kept by the Franklin Conservation Commission. In addition, there are no known records of any construction adjustments made in the field during construction, which could have allowed for corrections and greater project success.



Table 5: Site Vegetation Assessment Summary

Site #	Summary of Permit Specifications Related to Vegetation and Plantings	Summary Assessment of Site Vegetation
1	Only wetland replication size and location specified.	Site dominated by upland plants.
2	Use wetland seed mixture with 2 species (Reed Canary Grass @ 20 lbs./ac, Ladino White Clover @ 1 lb./ac). Re-use soils from disturbed wetland in the replication.	Dominated by mature Staghorn Sumac - replication area not built.
3	Detailed planting plan with planting densities for 10 species in 3 layers (herb, shrub swamp and tree). Transplant plants from disturbed area to replication.	<i>None</i> of the 10 species in the planting plan were documented, although 13 other native species were thriving in vigorous emergent shallow marsh.
4	Planting plan specified 25-30 red maple saplings, 50 shrubs (Highbush Blueberry and Sweet Pepperbush) and various herbaceous layer plantings.	Significant variation of site vegetation due to inconsistent grading (south side is wetter, north side is marginal). Planted trees/shrubs either missing or dead (several red maple saplings present)
5	Planting plan specified location/quantity of 4 species & location of "typical hummock clusters". Topsoil/organic material for replication to be taken from disturbed on-site wetlands.	Herbaceous wetland vegetation is diverse and vigorous within small remaining area (2/3 of site has been filled). 3 of the 4 planted species are thriving (only Cattail not present).
6	Planting plan included hand planting of a tree layer (12 Red Maple saplings), shrub layer (Sweet Pepperbush, Highbush Blueberry) and ground layer (6 species). Spacing for plantings specified, but not locations.	Transitional, marginal wetland community, with dense herbaceous and woody shrub/sapling vegetation. Some survival of planted Red maples and Sweet Pepperbush.
7	Detailed planting plan specifying quantity/location of 6 species (1 tree species, 2 shrub species and 3 herbaceous species). Planting to occur within 7 days of replication area preparation, between April 1- May 15 or Sept. 15 – Oct. 15.	Diverse, dense wetland herbaceous community. Purple Loosestrife abundant in monitoring plot, but >75% native wetland plant coverage for entire site. Excellent diversity (28 species). Good survival of tree and herb plantings, shrubs mostly missing.
8	Transplantation of shrubs from filled wetland (plus herbaceous seed bank in transplanted soils), and/or nursery transplants and wetland seed mixture. Shrub plantings at 1 shrub per 64 s.f.	Marginal wetland dominated by pole saplings of Eastern Cottonwood (FAC), as well as gray birch and red maple. Assessment of planting success not possible due to lack of specificity in planting plan.
9	<i>Recommended</i> broadcast of wetland seed mixture to provide herbaceous diversity. Shrub planting: 1 shrub per 64 s.f, including 32 Yellow Birch, 38 Red Maple, 32 Arrowwood, 64 Highbush Blueberry, and 64 Winterberry.	Undersized, although constructed replication area has thriving and diverse wet meadow community. Many specified shrub plantings are not present...24 red maples thriving at perimeter, 1 dead.
10	Transplant shrubs/ plants from filled area to replication. Shrubs: Highbush blueberry and swamp azalea, 8' apart Plants: skunk cabbage, sensitive fern, cinnamon fern, sphagnum	Replication area not built.
11-a	Planting plan indicated location and quantity of nursery-stock shrubs for the 3 sites. Hand-plantings to occur before June 30 or after October 15, within 4 days of arrival on project site.	Thriving wet meadow community. Majority of planted shrubs are dead or missing, possibly due to conditions being too wet.
11-b	Seed basin with perennial Ryegrass (80%)/ White Clover (20%) mix and apply water soluble, quick-release fertilizer, seed between April 15 and June 30.	Excellent survival of planted trees and shrubs.
11-c		Diverse and vigorous emergent marsh/wet meadow with open water areas. Many tree/shrub plantings failed due to conditions being too wet.
12	Plant a combination of seeds such as Switchgrass (<i>Panicum virgatum</i>) and plants such as Sedge (<i>Carex spp.</i>) between April 1 and May 15 or September 5 and October 15.	Transitional wetland meadow community.



4.5 Wetland Replication Functions and Values

The Massachusetts Wetlands Protection Act regulations clearly describe the public interests and related wetland functions that must be considered when providing replication for impacted inland wetlands (public and private water supply, groundwater supply, flood control, storm damage prevention, pollution prevention, fisheries, and wildlife habitat). Although exact replication of lost wetland functions is a desirable goal, it is important to note that the Massachusetts Inland Wetland Replication Guidelines (DEP, 2002) clearly provide for flexibility in replication design to promote the maximum wetland functionality that can be achieved at the selected site. As stated in these Guidelines, “...replication efforts should focus on design characteristics that strive to maximize capacity for the functions impacted, as well as the functions the new wetland site will support. “

As described in Section 2, each of the wetland replication sites was assessed for wetland functions and values according to the methodology developed by the US Army Corps of Engineers (ACOE)-Regulatory Division and published in a booklet titled “Wetland Functions and Values – A Descriptive Approach” (see excerpts and data sheets in Appendix B). This methodology provides a qualitative assessment of wetland areas with regard to the 13 wetland function/value categories listed below in Table 6. Table 6 provides an overview of the functions/values that were considered substantially present at each of the replication sites:

Table 6: Wetland Replication Functions & Values Assessment Summary

Wetland Function / Value	Wetland Replication Site													
	1	2	3	4	5	6	7	8	9	10	11a	11b	11c	12
Groundwater Recharge / Discharge	✓		✓			✓	✓				✓			
Floodflow Alteration	✓		✓	✓					✓		✓	✓	✓	✓
Fish and Shellfish Habitat														
Sediment / Toxicant Retention				✓	✓	✓	✓	✓						
Nutrient Removal	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
Production Export			✓				✓						✓	
Sediment / Shoreline Stabilization														
Wildlife Habitat			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Recreation														
Educational / Scientific Value														
Uniqueness / Heritage														
Visual Quality / Aesthetics			✓						✓					
Endangered Species Habitat														



The ACOE wetland function/value categories most commonly present at the fourteen replication sites were Nutrient Removal (11 sites), Wildlife Habitat (11 sites) and Floodflow Retention (10 sites). Functions/Values less commonly present were Sediment/Toxicant Retention (5 sites), Production Export (3 sites), Groundwater Recharge/Discharge (3 sites) and Visual Quality /Aesthetics (2 sites).

As Table 6 shows, 6 of the 13 ACOE wetland function/value categories were not substantially present at any of the replication sites. This is not surprising, since the ACOE methodology is designed as a general wetland assessment tool and is not tailored specifically for wetland replications. For example, it is extremely unlikely that any recently constructed wetland replication would be considered to have “Uniqueness/Heritage” value, and it is also unlikely for such a site to be designed or intended to serve any type of recreational function.

Since similar pre-construction functional assessments were not conducted at any of the impacted wetlands requiring replication, it is difficult to directly compare the lost wetland functions with those currently present. To some extent, it is possible to compare wildlife habitat function of the impacted and replicated wetland areas by comparing the vegetation communities of these areas. However, it is important to bear in mind that the replication areas are quite young (most are less than ten years old) with regards to natural community succession, and can be expected to mature and change with time. As such, a comparison of natural communities provides only a snapshot of current conditions that may be predictive of future conditions as the replication matures.

The replication project site plans and other permit documents indicate that most of the projects involved impacts to forested wetland areas. With the exception of Site 8 (dominated by transitional pole saplings), these forested areas have been replicated with areas that are currently dominated by herbaceous vegetation (not including the sites 2 and 10, which were not constructed). This finding is consistent with the statewide 1998 University of Massachusetts study (Brown and Veneman). Over time and as part of a natural succession process, some of these sites (particularly sites 7, 9 and 11-b) appear to have the potential to develop into forested wetland communities similar to those they were intended to replicate. Other sites are likely to develop forested communities that have “drier”, more transitional species than the wetlands they are replacing (Sites 1, 4, 6, 8, 12). Several of the wettest sites (sites 3, 11-c) appear to have ample hydrology to sustain an emergent marsh community. In particular, sites 3 and 11-c are good examples of replication sites that do not precisely match the features of the impacted wetland, but do a very good job of maximizing wetland function in a way that is compatible with and complementary to their setting and adjacent wetlands.



4.6 Recommendations

This study indicates that wetland replication projects in the Town of Franklin over the past 15 years have had a high rate of non-compliance with permit requirements. Given the findings of previous wetland replication assessment studies involving a much larger sample sets (i.e. Brown and Veneman - University of Massachusetts), neither the incidence of non-compliance in Franklin nor the types of non-compliance documented by this study are particularly surprising. However, it is worthy of note that the replication projects assessed in this study were selected from a list of projects that had all previously been issued a Certificate of Compliance from the Franklin Conservation Commission.

The fourteen replication areas assessed in this study were permitted between the years of 1987 and 1998. In response to a growing body of evidence on the incidence of non-compliance for these types wetland replications, the Massachusetts DEP promulgated its Inland Wetland Replication Guidelines in 2002. These Guidelines provide a comprehensive discussion of the process of building and regulating a successful wetland replication, including detailed recommendations on site selection, design specifications, permit application and site plan requirements, construction, monitoring requirements, and other related regulatory issues. The Guidelines provide Conservation Commissions with a thorough template for providing appropriate regulatory oversight to ensure well-constructed and properly functioning wetland replication areas that are in compliance with permit requirements. It is not the intention of this study to develop a set of wetland replication recommendations for the Town of Franklin that duplicate the function already well-provided by the DEP Guidelines. On the contrary, it is clear that many of the regulatory compliance issues identified at the fourteen Franklin sites could have been easily avoided by following site assessment, design and monitoring protocols similar to those described in the DEP Guidelines. With that in mind, the recommendations provided in the following sections are intended to complement the DEP Guidelines and provide additional guidance with regard to the regulatory tasks of (1) developing Orders of Conditions, (2) construction oversight, and (3) issuing Certificates of Compliance.

4.6.1 Order of Conditions

- ***Document the type of wetland being altered.***
 - a. The Conservation Commission should require the applicant to specify (1) the type of wetland being altered, and (2) the primary functions and values associated with the wetland. The Conservation should (1) confirm this information as part of a site inspection and (2) incorporate this information when issuing an Order of Conditions.
 - b. Additional documentation to be cited in the Order of Conditions should include soil profiles, approximate hydrologic budget, and dominant vegetation. A cross section of the site's microtopography is also helpful.
- ***Document the type of wetland being proposed.***
 - a. The Order of Conditions should specify the anticipated successional state of the replication area at the projected time of a filing for a Certificate of Compliance (CoC). This will help the Commission assess if the replication is "on target" to eventually provide replication for impacts to a mature wetland system (i.e. forested wetland) that may take many years to develop. For example, if a replication area that was intended to develop into a forested swamp has the



characteristics of a shallow marsh/emergent swamp at the time of the CoC filing, the applicant and Conservation Commission will know that the grading/hydrology was incorrect (too wet) and may require modification (i.e. grading “islands” with hydrology more appropriate for desired wetland tree species). The Commission’s discretion when requiring modifications to the replication area should be on a case-by case basis and should consider the overall wetland functions and values that the replication area is providing.

- b. Specific measures of success should be discussed and summarized in the Order of Conditions. Given that it takes time for a replicated area to reach a certain successional stage (2 to 20 years and more), the ability to assess the probability of functional success will be critical to the issuance of a Certificate of Compliance (flooding, soil profiles, wildlife habitat, etc.). Ask for a proposed cross section to ensure appropriate microtopography is constructed.
- **Ensure the replication is constructed.**
 - a. The Commission should specify a construction schedule (ideally discussed as part of the public hearing), and require submittal of periodic construction reporting (e.g. every week, month, etc.).
 - b. The Order of Conditions should specify that failure to submit construction reports would be considered as a cause for issuing a Cease and Desist Order (if necessary). The reports should include nursery receipts, as appropriate.
- **Ensure the replication area is constructed accurately.**
 - a. If allowed under local bylaw, require that a bond be posted to ensure compliance with plans and protocol set forth in the Order of Conditions. If not, discuss with the applicant and include in the Order a requirement that an independent wetland scientist conduct construction monitoring and reporting.
 - b. The Order of Conditions should request an As-Built plan, showing contours or spot grades, of the sub-grade of wetland replication areas, as well as finished grades.
- **Establish a monitoring protocol.** The Order of Conditions should include an approved monitoring protocol. Ideally, the monitoring protocol should be submitted as part of the Notice of Intent for discussion during the public hearing process.

4.6.2 Construction Oversight

- **Construction oversight.** During construction, the Commission should require that replication areas be staked out in the field, and the Commission should inspect the staked location.
- **Review periodic construction inspection reports.** Take action or ask questions if something is not clear. In our experience, even though items are documented and highlighted, Conservation Commissions do not always follow through on the reports.
- **Conduct periodic site inspection.** Ask questions. Compare the field conditions to the plans. Be visible. Get to know the contractor(s).



- **Cease and Desist Orders.** Learn how to discuss and issue Cease and Desist Orders, if necessary. When considering a Cease and Desist Order, be sure to evaluate site stability. Take steps to prevent sites from being left unstable for prolonged periods as a result of a Cease and Desist Order.

4.6.3 Certificate of Compliance

- ***Review the As-Built Plans and the Monitoring Reports as part of a public meeting.*** Request that the applicant be present. Request that photographs be submitted as part of the Request for Certificate of Compliance.
- ***Conduct a site visit.*** Take photographs. Do not bow to pressures that a Certificate be issued as soon as possible in order to release a bond, or remove the Order from the property for ownership transfer reasons. Consider issuing a partial Certificate, if there is a portion of the property that properly meets the Orders of Conditions.

APPENDIX 1:

Wetland Replication Field Data Forms



Town of Franklin

Wetland Replication Data Report



Site: 1
Investigators: Jeff Rogers

Franklin

MA

Norfolk County

Investigation Date: 10/10/2002 10:45

Weather: Overcast

Location: 1-1 Easting: 208,919.33 Northing: 871,353.82 NWIClass: Not A Wetland
Are Hydrophytic Plants Dominant? No Is Wetland Hydrology Present?: No
Are Hydric Soils Present?: No Is this a Wetland?: No Photos: 612,613,614
Comments: Boulders present, center of replication used as plot, invasive japanese knotweed abundant around edge of replication

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
GOLDEN-ROD,CANADA	Solidago canadensis	S [<5%]	FACU
RASPBERRY,COMMON RED	Rubus idaeus	S [<5%]	FAC-
MAPLE,RED	Acer rubrum	S [<5%]	FAC
Shrub			
KNOTWEED,JAPANESE	Polygonum cuspidatum	S [<5%]	FACU-
SASSAFRAS	Sassafras albidum	C [6-25%]	FACU-
GRAPE,FOX	Vitis labrusca	A [26-50%]	FACU
RASPBERRY,COMMON RED	Rubus idaeus	S [<5%]	FAC-
MAPLE,RED	Acer rubrum	S [<5%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches Other Hydrologic Indicators present:
Depth to Groundwater: inches Depth to Saturation: >14 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-6	A1	10YR 3 / 2	Very Fine Sandy Loam		/	/	
6-14	A2	10YR 5 / 8	Fine Sandy Loam		/	/	14" refusal



Town of Franklin

Wetland Replication Data Report



Site: 1
Investigators: Jeff Rogers

Franklin

MA

Norfolk County

Investigation Date: 10/10/2002 10:45

Weather: Overcast

Location: 1-W Easting: 208,936.85 Northing: 871,352.64 NWIClass: Palustrine Forested Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 615,616
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
BOG MOSS	Aulacomnium palustre	S [<5%]	NI
IVY, POISON	Toxicodendron radicans	S [<5%]	FAC
ARROW-WOOD	Viburnum dentatum	C [6-25%]	FAC
Shrub			
BUTTERNUT	Juglans cinerea	S [<5%]	FACU+
ARROW-WOOD	Viburnum dentatum	D [>50%]	FAC
Tree			
MAPLE, RED	Acer rubrum	D [>50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Int. Flooded Depth of Surfacewater: inches
Depth to Groundwater: inches Depth to Saturation: >16 inches
Other Hydrologic Indicators present:
Buttressed Trees
Water-Stained Leaves

Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0.5-0	O	/	Peaty Rootmass	/	/	/	
0-8	A	7.5YR 3 / 1	Fine Sandy Loam w/gravel	15	/	/	
8-16	B	10YR 3 / 3	Sandy Loam, Gravel	25	/	/	16" refusal



Town of Franklin

Wetland Replication Data Report



Site: 10 Franklin MA Norfolk County Investigation Date: 9/30/2002 14:00
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 10-W Easting: 206,589.77 Northing: 873,898.63 NWIClass: Palustrine Forested Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: No
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos:
Comments: Replication never built; Culvert diverts water away from wetland (impaired)

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
GREENBRIER, COMMON	Smilax rotundifolia	C [6-25%]	FAC
Shrub			
WITHE-ROD	Viburnum cassinoides	S [<5%]	FACW
PEPPER-BUSH, COAST	Clethra alnifolia	D [>50%]	FAC+
WITCH-HAZEL, AMERICAN	Hamamelis virginiana	C [6-25%]	FAC-
Tree			
OAK, NORTHERN RED	Quercus rubra	D [>50%]	FACU-
PINE, EASTERN WHITE	Pinus strobus	S [<5%]	FACU
MAPLE, RED	Acer rubrum	D [>50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >16 inches
Comments: Hydrology is limited by installation of nearby culvert.

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
2-0	O	/	Peat		/	/	
0-2	A	10YR 2 / 2	Fine Sandy Loam		/	/	
2-14	B	10YR 3 / 3	Fine Sandy Loam	30	7.5YR 5 / 8	/	
14-16	C	7.5YR 4 / 6	Loamy Sand, Gravel		/	/	refusal at 16"



Town of Franklin

Wetland Replication Data Report



Site: 11 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/4/2002 15:00
Weather: Sunny

Location: 11a-1 Easting: 205,753.38 Northing: 875,032.65 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 665,666
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
DOCK, SWAMP	Rumex verticillatus	S [<5%]	OBL
RUSH, CANADA	Juncus canadensis	C [6-25%]	OBL
MONKEY-FLOWER, ALLEGHANY	Mimulus ringens	S [<5%]	OBL
CATTAIL, BROAD-LEAF	Typha latifolia	C [6-25%]	OBL
ELEOCHARIS SP.	Eleocharis sp.	S [<5%]	NI (OBL)
RUSH, SOFT	Juncus effusus	C [6-25%]	FACW+
REDTOP PANIC GRASS	Panicum rigidulum	C [6-25%]	FACW+
GRASS, RED-TOP PANIC	Panicum rigidulum	C [6-25%]	FACW+
SMARTWEED, PENNSYLVANIA	Polygonum pensylvanicum	S [<5%]	FACW
FRAGRANT-GOLDEN-ROD, FLAT-TOP	Euthamia graminifolia	S [<5%]	FAC
Shrub			
BLUEBERRY, HIGHBUSH	Vaccinium corymbosum	S [<5%]	FACW-
ARROW-WOOD, NORTHERN	Viburnum recognitum	S [<5%]	FACW-
MAPLE, RED	Acer rubrum	S [<5%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Int. Flooded Depth of Surfacewater: inches
Depth to Groundwater: inches Depth to Saturation: >16 inches

Other Hydrologic Indicators present:

Water-Stained Leaves
Pockets of Surface Water

Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-8	A	10YR 3 / 2	Fine Silty Loam		/	/	
8-16	C1	10YR 6 / 6	Med. Sand, w/Gravel	50	2.5YR 3 / 6	/	
16+	C2	10YR 6 / 2	Very Fine Silty Sand		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 11
Investigators: Bob Hartzel, Jeff Rogers

Franklin

MA

Norfolk County

Investigation Date: 10/4/2002 15:00

Weather: Sunny

Location: 11a-W Easting: 205,783.53 Northing: 875,029.60 NWIClass: Palustrine Forested Wetland

Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes

Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 663,664

Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
WOOD-REEDGRASS,STOUT	Cinna arundinacea	S [<5%]	FACW+
ARROW-WOOD,NORTHERN	Viburnum recognitum	C [6-25%]	FACW-
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	S [<5%]	FACW
BLACKBERRY,BRISTLY	Rubus hispidus	C [6-25%]	FACW
FERN,SENSITIVE	Onoclea sensibilis	A [26-50%]	FACW
IVY,POISON	Toxicodendron radicans	S [<5%]	FAC
Sapling/Lianas			
BURNING-BUSH,EASTERN	Euonymus atropurpureus	C [6-25%]	FACU
BUCKTHORN,GLOSSY	Rhamnus frangula	S [<5%]	FAC
Shrub			
ARROW-WOOD,NORTHERN	Viburnum recognitum	C [6-25%]	FACW-
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	C [6-25%]	FACW-
WITHE-ROD	Viburnum cassinoides	S [<5%]	FACW
Tree			
MAPLE,RED	Acer rubrum	D [>50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions:

Depth of Surfacewater: inches

Other Hydrologic Indicators present:

Depth to Groundwater: inches

Depth to Saturation: >20 inches

Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0.5-0	O	/	Peat		/	/	
0-10	A	10YR 2 / 1	Silt Loam		/	/	
10-16	B	10YR 4 / 1	Loamy Fine Sand		/	/	
16-20	E	5YR 3 / 4	Loamy Fine Sand		/	/	
20+	C	2.5Y 5 / 4	Silt, Sand		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 11
Investigators: Bob Hartzel, Jeff Rogers

Franklin

MA

Norfolk County

Investigation Date: 10/4/2002 15:00

Weather: Sunny

Location: 11b-1 Easting: 205,680.08 Northing: 874,983.19 NWIClass: Palustrine Emergent Wetland

Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes

Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 595,596,668,667

Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
BUTTER-CUP,NORTHERN SWAMP	Ranunculus septentrionalis	C [6-25%]	OBL
RUSH,SOFT	Juncus effusus	A [26-50%]	FACW+
BENTGRASS,PERENNIAL	Agrostis perennans	A [26-50%]	FACU
Sapling/Lianas			
MAPLE,RED	Acer rubrum	S [<5%]	FAC
Shrub			
ARROW-WOOD,NORTHERN	Viburnum recognitum	S [<5%]	FACW-
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	S [<5%]	FACW-

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches

Depth to Groundwater: inches Depth to Saturation: >18 inches

Other Hydrologic Indicators present:

Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-8	A	10YR 3 / 2	Fine Sandy Loam	15	/	/	
8-18+	C	2.5Y 5 / 3	Very Fine Sandy Silt	50	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 11 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/4/2002 15:00
Weather: Sunny

Location: 11b-W Easting: 205,693.21 Northing: 874,966.14 NWIClass: Palustrine Forested Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 597,598
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
SEDGE,UPTIGHT	Carex stricta	D [>50%]	OBL
Sapling/Lianas			
BUCKTHORN,GLOSSY	Rhamnus frangula	S [<5%]	FAC
Shrub			
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	S [<5%]	FACW-
ARROW-WOOD,NORTHERN	Viburnum recognitum	S [<5%]	FACW-
Tree			
MAPLE,RED	Acer rubrum	D [>50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Seasonally Flooded Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >18 inches Buttressed Trees
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
2-0	O	/			/	/	
0-8	A	10YR 2 / 1	Fine Sandy Silt		/	/	
8-12	B	10YR 5 / 3	Fine Sandy Silt	40	10YR 5 / 4	/	
12-18	C	2.5Y 6 / 1	Silty Clay Loam	15	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 11 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/4/2002 15:00
Weather: Sunny

Location: 11c-1 Easting: 205,678.30 Northing: 875,398.11 NWIClass: Palustrine Aquatic Bed

Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 669
Comments: Frogs, wildlife evidence (chewed vegetation); Flag represents soil location; Many tree/shrub plantings failed.

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
<i>Herbs</i>			
SEEDBOX,MARSH	Ludwigia palustris	A [26-50%]	OBL
CATTAIL,BROAD-LEAF	Typha latifolia	S [<5%]	OBL
CATTAIL,NARROW-LEAF	Typha angustifolia	S [<5%]	OBL
WEED,PICKEREL	Pontederia cordata	C [6-25%]	OBL
LOOSESTRIFE,SWAMP	Lysimachia terrestris	C [6-25%]	OBL
ELEOCHARIS SP.	Eleocharis sp.	C [6-25%]	NI (OBL)
WOOL-GRASS	Scirpus cyperinus	C [6-25%]	FACW+
SEDGE,BLUNT BROOM	Carex tribuloides	C [6-25%]	FACW+
SEEDBOX,BUSHY	Ludwigia alternifolia	A [26-50%]	FACW+
RUSH,SOFT	Juncus effusus	A [26-50%]	FACW+
IRONWEED,NEW YORK	Vernonia noveboracensis	S [<5%]	FACW+
ASTER,CALICO	Aster lateriflorus	S [<5%]	FACW-
STEEPLE-BUSH	Spiraea tomentosa	S [<5%]	FACW
SMARTWEED,PENNSYLVANIA	Polygonum pensylvanicum	S [<5%]	FACW
BLACKBERRY,BRISTLY	Rubus hispidus	S [<5%]	FACW
FLATSEDEGE,STRAW-COLOR	Cyperus strigosus	S [<5%]	FACW
STARWORT,LESSER	Stellaria graminea	A [26-50%]	FACU-

Representative Hydrologic Characteristics

Hydrologic Conditions: Perm. Flooded Depth of Surfacewater: 6 inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: 0 inches
Comments: Permanently Inundated

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-10	A	10YR 2 / 2	Sand, Silt		/	/	
10-20+	C	2.5Y 5 / 3	Silt, Clay and Sand		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 11 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/4/2002 15:00
Weather: Sunny

Location: 11c-W Easting: 205,704.18 Northing: 875,436.75 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 609,610
Comments: Pulpie Loostrife Abundant; Wildlife use (paths, tracks, feeding); 10ft to edge of stream bank

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
SEDGE,FRINGED	Carex crinita	A [26-50%]	OBL
SMARTWEED,DOTTED	Polygonum punctatum	C [6-25%]	OBL
TEARTHUMB,ARROW-LEAF	Polygonum sagittatum	C [6-25%]	OBL
FLOWER,CARDINAL	Lobelia cardinalis	S [<5%]	FACW+
LOOSESTRIFE,PURPLE	Lythrum salicaria	A [26-50%]	FACW+
FERN,SENSITIVE	Onoclea sensibilis	C [6-25%]	FACW
Shrub			
BUTTONBUSH,COMMON	Cephalanthus occidentalis	S [<5%]	OBL
WITHE-ROD	Viburnum cassinoides	C [6-25%]	FACW
Tree			
MAPLE,RED	Acer rubrum	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Seasonally Flooded Depth of Surfacewater: inches
Depth to Groundwater: inches Depth to Saturation: 0 inches
Comments: **Other Hydrologic Indicators present:** Buttressed Trees

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
17-0	O	10YR 2 / 1	Muck, Fine Sand		/	/	
0+	C	10YR 5 / 2	Sand, Gravel		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 12 Franklin MA Norfolk County Investigation Date: 9/30/2002 15:13
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 12-1 Easting: 205,815.25 Northing: 871,159.34 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?:
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos:
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
<i>Herbs</i>			
SEDGE,FRINGED	Carex crinita	S [<5%]	OBL
TEARTHUMB,ARROW-LEAF	Polygonum sagittatum	S [<5%]	OBL
BUTTER AND EGGS	Linaria vulgaris	S [<5%]	NI
RUSH,SOFT	Juncus effusus	C [6-25%]	FACW+
SNEEZEWEED,COMMON	Helenium autumnale	C [6-25%]	FACW+
IRONWEED,NEW YORK	Vernonia noveboracensis	C [6-25%]	FACW+
WOOL-GRASS	Scirpus cyperinus	S [<5%]	FACW+
VERVAIN,BLUE	Verbena hastata	S [<5%]	FACW+
ELM,AMERICAN	Ulmus americana	S [<5%]	FACW-
JOE-PYE-WEED,HOLLOW	Eupatoriadelphus fistulosus	S [<5%]	FACW
GOLDEN-ROD,CANADA	Solidago canadensis	A [26-50%]	FACU
MAPLE,RED	Acer rubrum	S [<5%]	FAC
FRAGRANT-GOLDEN-ROD,FLAT-TOP	Euthamia graminifolia	C [6-25%]	FAC
GOLDEN-ROD,WRINKLED	Solidago rugosa	A [26-50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches Other Hydrologic Indicators present:
Depth to Groundwater: inches Depth to Saturation: >20 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-15	A	10YR 3 / 2	Fine Sandy Loam		/	/	
15-20	B	10YR 4 / 4		15	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 12 Franklin MA Norfolk County Investigation Date: 9/30/2002 15:13
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 12-W Easting: 205,810.31 Northing: 871,179.46 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos:
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
<i>Herbs</i>			
SMARTWEED,DOTTED	Polygonum punctatum	S [<5%]	OBL
CAREX SP.	Carex sp.	C [6-25%]	NI
ASTER,CALICO	Aster lateriflorus	D [>50%]	FACW-
CREEPER,VIRGINIA	Parthenocissus quinquefolia	S [<5%]	FACU

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches Other Hydrologic Indicators present:
Depth to Groundwater: inches Depth to Saturation: 15 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-7	A1	10YR 3 / 2	Sandy Loam		/	/	
7-15	A2	10YR 3 / 1			/	/	
15+	B	10YR 4 / 4			/	/	20" refusal



Town of Franklin

Wetland Replication Data Report



Site: 2 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/4/2002 13:07
Weather: Overcast

Location: 2-1 Easting: 207,834.42 Northing: 869,813.89 NWIClass: Not A Wetland

Are Hydrophytic Plants Dominant? No Is Wetland Hydrology Present?: No

Are Hydric Soils Present?: No Is this a Wetland?: No Photos:

Comments: Replication not built, soils not investigated

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
CREEPER,VIRGINIA	Parthenocissus quinquefolia	C [6-25%]	FACU
GRAPE,FOX	Vitis labrusca	C [6-25%]	FACU
RASPBERRY,COMMON RED	Rubus idaeus	C [6-25%]	FAC-
	Equisetum sp.	S [<5%]	
Sapling/Lianas			
WITHE-ROD	Viburnum cassinoides	A [26-50%]	FACW
CREEPER,VIRGINIA	Parthenocissus quinquefolia	C [6-25%]	FACU
Shrub			
WITHE-ROD	Viburnum cassinoides	A [26-50%]	FACW
	Cornus sp.	S [<5%]	
Tree			
STAGHORN SUMAC	Rhus typhina	D [>50%]	NI

Representative Hydrologic Characteristics

Representative Soil Characteristics



Town of Franklin

Wetland Replication Data Report



Site: 2 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/4/2002 13:07
Weather: Overcast

Location: 2-W Easting: 207,819.80 Northing: 869,813.31 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos:
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
SMALL-REEDGRASS, NUTTALL'S	Calamagrostis cinnoides	D [>50%]	OBL
SKUNK-CABBAGE	Symplocarpus foetidus	S [<5%]	OBL
CATTAIL, BROAD-LEAF	Typha latifolia	S [<5%]	OBL
CREEPER, VIRGINIA	Parthenocissus quinquefolia	S [<5%]	FACU
Sapling/Lianas			
ELDER, AMERICAN	Sambucus canadensis	S [<5%]	FACW-
Tree			
ALDER, SPECKLED	Alnus rugosa	C [6-25%]	FACW+
MAPLE, RED	Acer rubrum	A [26-50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Saturated Depth of Surfacewater: inches
Depth to Groundwater: inches Depth to Saturation: 0 inches
Comments: Other Hydrologic Indicators present:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
6-0	O	/	Muck		/	/	
0-14	A	10YR 2 / 2	Fine Sandy Loam	30	10YR 6 / 8	10YR 6 / 1	
14-18	B	10YR 3 / 1	Sandy Loam		/	/	
18+	C	2.5Y 5 / 2	Sand		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 3 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/2/2002 1:00
Weather: Sunny

Location: 3-1 Easting: 208,106.61 Northing: 873,029.77 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present? Yes
Are Hydric Soils Present? Yes Is this a Wetland? Yes Photos: 581,585
Comments: High wildlife habitat; using entire replication; beaver chewings and muskrat paths

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
BEDSTRAW,STIFF MARSH	Galium tinctorium	S [<5%]	OBL
SEDGE,SHALLOW	Carex lurida	C [6-25%]	OBL
SEDGE,THREE-WAY	Dulichium arundinaceum	S [<5%]	OBL
DUCKWEED,LESSER	Lemna minor	S [<5%]	OBL
CATTAIL,NARROW-LEAF	Typha angustifolia	C [6-25%]	OBL
BURREED,AMERICAN	Sparganium americanum	D [>50%]	OBL
ARROW-HEAD,BROAD-LEAF	Sagittaria latifolia	S [<5%]	OBL
WATER STARWORT	Callitriche palustris	S [<5%]	NI
WOOL-GRASS	Scirpus cyperinus	S [<5%]	FACW+
RUSH,SOFT	Juncus effusus	S [<5%]	FACW+
JOE-PYE-WEED,HOLLOW	Eupatoriadelphus fistulosus	S [<5%]	FACW
	Gramineae sp.	A [26-50%]	
Shrub			
ROSE,SWAMP	Rosa palustris	C [6-25%]	OBL
ALDER,SPECKLED	Alnus rugosa	C [6-25%]	FACW+

Representative Hydrologic Characteristics

Hydrologic Conditions: Perm. Flooded Depth of Surfacewater: 8 inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: 0 inches
Comments: Flooded with 6-9 inches water during drought conditions

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
2-0	O	/	Muck		/	/	
0-12	A	10YR 3 / 2	Fine Sandy Loam		/	/	
12-18	C	5Y 4 / 2	Sand, Gravel		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 3 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/2/2002 1:00
Weather: Sunny

Location: 3-W Easting: 208,086.38 Northing: 873,012.28 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 584
Comments: High wildlife habitat; hummock and hollows

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
BEGGAR-TICKS,NODDING	Bidens cernua	D [>50%]	OBL
ASTER,SWAMP	Aster puniceus	S [<5%]	OBL
BURREED,AMERICAN	Sparganium americanum	S [<5%]	OBL
BEDSTRAW,STIFF MARSH	Galium tinctorium	S [<5%]	OBL
CATTAIL,NARROW-LEAF	Typha angustifolia	S [<5%]	OBL
DUCKWEED,LESSER	Lemna minor	S [<5%]	OBL
SEDGE,SHALLOW	Carex lurida	C [6-25%]	OBL
DUCKWEED,GREATER	Spirodela polyrhiza	S [<5%]	OBL
WOOL-GRASS	Scirpus cyperinus	C [6-25%]	FACW+
FERN,SENSITIVE	Onoclea sensibilis	S [<5%]	FACW
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	S [<5%]	FACW
FERN,MASSACHUSETTS	Thelypteris simulata	S [<5%]	FACW
Shrub			
ROSE,SWAMP	Rosa palustris	C [6-25%]	OBL
ALDER,SPECKLED	Alnus incana	C [6-25%]	NI
ARROW-WOOD,NORTHERN	Viburnum recognitum	S [<5%]	FACW-
MAPLE,RED	Acer rubrum	S [<5%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Perm. Flooding Depth of Surfacewater: 3 inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: 0 inches
Comments: Flooded with 2-4 inches water during drought conditions, hummock and hollows

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
10-0	O	/	Muck, Sand		/	/	
0-4	B1	10YR 5 / 2	Fine Sand, Silt		/	/	
4-6	B2	10YR 6 / 1	Fine Sand, Silt		/	/	
6-10	C	10YR 5 / 1	Sand, Gravel		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 4 Franklin MA Norfolk County Investigation Date: 9/30/2002 10:00
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 4-1 Easting: 204,209.40 Northing: 865,585.51 NWIClass: Palustrine Scrub-Shrub Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?:
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 627,628,629
Comments: Grading problems

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
SKUNK-CABBAGE	Symplocarpus foetidus	S [<5%]	OBL
SMARTWEED, WATER	Polygonum amphibium	C [6-25%]	OBL
MONKEY-FLOWER, ALLEGHANY	Mimulus ringens	S [<5%]	OBL
SEDGE, SHALLOW	Carex lurida	C [6-25%]	OBL
SMARTWEED, DOTTED	Polygonum punctatum	C [6-25%]	OBL
GOLDEN-ROD, ROUGH-LEAF	Solidago patula	C [6-25%]	OBL
RUSH, SOFT	Juncus effusus	A [26-50%]	FACW+
TOUCH-ME-NOT, SPOTTED	Impatiens capensis	C [6-25%]	FACW
STEEPLE-BUSH	Spiraea tomentosa	C [6-25%]	FACW
GRAPE, FOX	Vitis labrusca	C [6-25%]	FACU
FALSE-BUCKWHEAT, CLIMBING	Polygonum scandens	S [<5%]	FAC
Sapling/Lianas			
ELM, AMERICAN	Ulmus americana	S [<5%]	FACW-
MAPLE, SILVER	Acer saccharinum	S [<5%]	FACW
WILLOW, BEBB	Salix bebbiana	S [<5%]	FACW
MAPLE, RED	Acer rubrum	S [<5%]	FAC
Shrub			
STAGHORN SUMAC	Rhus typhina	C [6-25%]	NI
ELDER, AMERICAN	Sambucus canadensis	A [26-50%]	FACW-
SPICEBUSH, NORTHERN	Lindera benzoin	S [<5%]	FACW-
RASPBERRY, COMMON RED	Rubus idaeus	C [6-25%]	FAC-

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >18 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-9	A	10YR 3 / 1	Very Fine Silt Loam	15	/	/	
9-18	B	2.5Y 5 / 3	Very Fine Silt w/Sand	40	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 4 Franklin MA Norfolk County Investigation Date: 9/30/2002 10:00
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 4-2 Easting: 204,217.28 Northing: 865,585.75 NWIClass: Palustrine Scrub-Shrub Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?:
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 630,631,632
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
IRIS, YELLOW	Iris pseudacorus	S [<5%]	OBL
TOUCH-ME-NOT, SPOTTED	Impatiens capensis	S [<5%]	FACW
RASPBERRY, COMMON RED	Rubus idaeus	D [>50%]	FAC-
GOLDEN-ROD, WRINKLED	Solidago rugosa	A [26-50%]	FAC
FRAGRANT-GOLDEN-ROD, FLAT-TOP	Euthamia graminifolia	C [6-25%]	FAC
Shrub			
STAGHORN SUMAC	Rhus typhina	C [6-25%]	NI
WINTERBERRY, COMMON	Ilex verticillata	S [<5%]	FACW+
ELDER, AMERICAN	Sambucus canadensis	C [6-25%]	FACW-
WILLOW, BEBB	Salix bebbiana	S [<5%]	FACW
GRAPE, FOX	Vitis labrusca	C [6-25%]	FACU
Tree			
BIRCH, RIVER	Betula nigra	S [<5%]	FACW

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >18 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-9	A	10YR 3 / 1	Very Fine Silt Loam	10	/	/	
9-18	B	2.5Y 6 / 4	Very Fine Silt Loam	40	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 4 Franklin MA Norfolk County Investigation Date: 9/30/2002 10:00
 Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 4-W Easting: 204,217.60 Northing: 865,543.04 NWIClass: Palustrine Forested Wetland

Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
 Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 625,626
 Comments: Abundance of winterberry, elderberry and spice bush; multiflora rose present; flag and plot visible from road

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
GRASS,CANADA MANNA	Glyceria canadensis	S [<5%]	OBL
SKUNK-CABBAGE	Symplocarpus foetidus	S [<5%]	OBL
TEARTHUMB,ARROW-LEAF	Polygonum sagittatum	D [>50%]	OBL
BURREED,AMERICAN	Sparganium americanum	S [<5%]	OBL
BOG MOSS	Aulacomnium palustre	S [<5%]	NI
WOOD-REEDGRASS,STOUT	Cinna arundinacea	S [<5%]	FACW+
WOOL-GRASS	Scirpus cyperinus	S [<5%]	FACW+
FERN,SENSITIVE	Onoclea sensibilis	C [6-25%]	FACW
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	C [6-25%]	FACW
Sapling/Lianas			
BIRCH,RIVER	Betula nigra	C [6-25%]	FACW
MAPLE,RED	Acer rubrum	C [6-25%]	FAC
Shrub			
SUMAC,POISON	Toxicodendron vernix	S [<5%]	OBL
SPICEBUSH,NORTHERN	Lindera benzoin	S [<5%]	FACW-
ELDER,AMERICAN	Sambucus canadensis	S [<5%]	FACW-
WILLOW,BEBB	Salix bebbiana	S [<5%]	FACW
ROSE,MULTIFLORA	Rosa multiflora	S [<5%]	FACU
ARROW-WOOD	Viburnum dentatum	C [6-25%]	FAC
Tree			
BIRCH,RIVER	Betula nigra	A [26-50%]	FACW
ASH,WHITE	Fraxinus americana	C [6-25%]	FACU
MAPLE,RED	Acer rubrum	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Saturated Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
 Depth to Groundwater: inches Depth to Saturation: 0 inches Butressed Trees
 Water Marks

Comments: Seasonally flooded

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
22-20	Oi1	10YR 2 / 1	Muck		/	/	
20-16	Oi2	10YR 5 / 2	Silt		/	/	
16-0	Oa	10YR 2 / 1	Very Fine Sand, Muck		/	/	
0+	C	GLE 1 6 / 10	Fine Sand		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 5 Franklin MA Norfolk County Investigation Date: 9/30/2002 11:30
 Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 5-1 Easting: 206,663.14 Northing: 867,254.62 NWIClass: Palustrine Scrub-Shrub Wetland
 Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
 Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 637,638
 Comments: Logs dumped in replication area. Section filled for adjacent construction. Does not support vernal pool habitat/function.

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
TEARTHUMB,ARROW-LEAF	Polygonum sagittatum	S [<5%]	OBL
SEDGE,FRINGED	Carex crinita	A [26-50%]	OBL
SEDGE,SHALLOW	Carex lurida	C [6-25%]	OBL
SHIELD-FERN,CRESTED	Dryopteris cristata	S [<5%]	FACW+
WOOL-GRASS	Scirpus cyperinus	D [>50%]	FACW+
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	C [6-25%]	FACW
STEEPLE-BUSH	Spiraea tomentosa	S [<5%]	FACW
BLACKBERRY,BRISTLY	Rubus hispidus	S [<5%]	FACW
GOLDEN-ROD,WRINKLED	Solidago rugosa	S [<5%]	FAC
Sapling/Lianas			
ELM,AMERICAN	Ulmus americana	S [<5%]	FACW-
MAPLE,RED	Acer rubrum	S [<5%]	FAC
Shrub			
ALDER,SPECKLED	Alnus rugosa	C [6-25%]	FACW+
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	A [26-50%]	FACW-
ELDER,AMERICAN	Sambucus canadensis	C [6-25%]	FACW-
PEPPER-BUSH,COAST	Clethra alnifolia	C [6-25%]	FAC+
Tree			
MAPLE,RED	Acer rubrum	S [<5%]	FAC

Representative Hydrologic Characteristics

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-10	A	10YR 2 / 2	Fine Sandy Loam		/	/	
10-18	C	2.5YR 6 / 2	Fine Sand, Silt		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 5 Franklin MA Norfolk County Investigation Date: 9/30/2002 11:30
 Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 5-W Easting: 206,650.49 Northing: 867,272.22 NWIClass: Palustrine Forested Wetland

Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes

Are Hydric Soils Present?: Yes Is this a Wetland?: Yes

Photos:

Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
BOG MOSS	Aulacomnium palustre	S [<5%]	NI
ASTER,CALICO	Aster lateriflorus	S [<5%]	FACW-
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	S [<5%]	FACW
IVY,POISON	Toxicodendron radicans	C [6-25%]	FAC
ARROW-WOOD	Viburnum dentatum	C [6-25%]	FAC
Sapling/Lianas			
ASH,GREEN	Fraxinus pennsylvanica	S [<5%]	FACW
MAPLE,RED	Acer rubrum	S [<5%]	FAC
Shrub			
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	S [<5%]	FACW-
ASH,GREEN	Fraxinus pennsylvanica	S [<5%]	FACW
DOGWOOD,SILKY	Cornus amomum	S [<5%]	FACW
WITHE-ROD	Viburnum cassinoides	S [<5%]	FACW
ARROW-WOOD	Viburnum dentatum	C [6-25%]	FAC
Tree			
ELM,AMERICAN	Ulmus americana	C [6-25%]	FACW-
OAK,WHITE	Quercus alba	S [<5%]	FACU-
MAPLE,RED	Acer rubrum	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Int. Flooded Depth of Surfacewater: inches
 Depth to Groundwater: inches Depth to Saturation: 16 inches

Other Hydrologic Indicators present:

Sediment Deposition
 Buttressed Trees
 Water-Stained Leaves
 Surface Scouring
 Water Marks
 Drainage Patterns

Comments: Recent evidence of flooding

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
2-0	O	/	Peat		/	/	
0-7	A	10YR 2 / 1	Sandy Loam		/	/	
7-18	B	10YR 5 / 2	Sand, Silt	50	10YR 6 / 6	10YR 5 / 1	
18+	C	10YR 4 / 1	Silt, Gravel		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 6 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/2/2002 10:30
Weather: Sunny

Location: 6-1 Easting: 210,915.17 Northing: 871,804.04 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?:
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos:
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
MEADOW-SWEET,NARROW-LEAF	Spiraea alba	C [6-25%]	FACW+
BLACKBERRY,BRISTLY	Rubus hispidus	S [<5%]	FACW
SEDGE,POINTED BROOM	Carex scoparia	C [6-25%]	FACW
PINE,EASTERN WHITE	Pinus strobus	S [<5%]	FACU
GOLDEN-ROD,CANADA	Solidago canadensis	A [26-50%]	FACU
IVY,POISON	Toxicodendron radicans	C [6-25%]	FAC
FRAGRANT-GOLDEN-ROD,FLAT-TOP	Euthamia graminifolia	C [6-25%]	FAC
GOLDEN-ROD,WRINKLED	Solidago rugosa	C [6-25%]	FAC
Sapling/Lianas			
ELM,AMERICAN	Ulmus americana	C [6-25%]	FACW-
ASPEN,QUAKING	Populus tremula	S [<5%]	FACU
MAPLE,RED	Acer rubrum	S [<5%]	FAC
Shrub			
DOGWOOD,RED-OSIER	Cornus stolonifera	A [26-50%]	FACW+

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >20 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-6	A	10YR 3 / 2	Fine Sandy Loam		/	/	
6-20	B	2.5Y 5 / 6	Very Fine Sand, Silt		/	/	
20+	C	2.5Y 6 / 6	Fine Sand	40	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 6 Franklin
Investigators: Bob Hartzel, Jeff Rogers

MA Norfolk County

Investigation Date: 10/2/2002 10:30
Weather: Sunny

Location: 6-W Easting: 210,927.48 Northing: 871,797.32 NWIClass: Palustrine Forested Wetland

Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes

Are Hydric Soils Present?: Yes Is this a Wetland?: Yes

Photos:

Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
FERN, SENSITIVE	Onoclea sensibilis	C [6-25%]	FACW
BLACKBERRY, BRISTLY	Rubus hispidus	S [<5%]	FACW
PINE, EASTERN WHITE	Pinus strobus	S [<5%]	FACU
SERVICE-BERRY, OBLONG-LEAF	Amelanchier canadensis	C [6-25%]	FAC
IVY, POISON	Toxicodendron radicans	S [<5%]	FAC
MAPLE, RED	Acer rubrum	S [<5%]	FAC
	Solidago sp.	S [<5%]	
Sapling/Lianas			
ELM, AMERICAN	Ulmus americana	S [<5%]	FACW-
CHERRY, BLACK	Prunus serotina	S [<5%]	FACU
MAPLE, RED	Acer rubrum	S [<5%]	FAC
Shrub			
ARROW-WOOD, NORTHERN	Viburnum recognitum	S [<5%]	FACW-
PINE, EASTERN WHITE	Pinus strobus	S [<5%]	FACU
SERVICE-BERRY, OBLONG-LEAF	Amelanchier canadensis	C [6-25%]	FAC
Tree			
ELM, AMERICAN	Ulmus americana	S [<5%]	FACW-
MAPLE, RED	Acer rubrum	D [>50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Seasonally Flooded

Depth of Surfacewater: inches

Other Hydrologic Indicators present:

Depth to Groundwater: inches

Depth to Saturation: >20 inches

Buttressed Trees

Comments: Seasonally inundated/saturated

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0.5-0	O	/	Mucky Peat		/	/	
0-6	A	10YR 3 / 2	Fine Sandy Loam		/	/	
6-20	B	2.5Y 5 / 6	Very Fine Sand, Silt	15	/	/	
20+	C	2.5Y 6 / 6	Fine Sand	40	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 7 Franklin
Investigators: Bob Hartzel, Sara Konrad

MA Norfolk County

Investigation Date: 9/26/2002 14:12
Weather: Overcast

Location: 7-1 Easting: 208,013.92 Northing: 871,428.43 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos:
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
CATTAIL,NARROW-LEAF	Typha angustifolia	S [<5%]	OBL
TEARTHUMB,ARROW-LEAF	Polygonum sagittatum	C [6-25%]	OBL
CATTAIL,BROAD-LEAF	Typha latifolia	S [<5%]	OBL
SEDGE,SHALLOW	Carex lurida	S [<5%]	OBL
GRASS,CANADA MANNA	Glyceria canadensis	S [<5%]	OBL
FERN,ROYAL	Osmunda regalis	C [6-25%]	OBL
ASTER,SWAMP	Aster puniceus	S [<5%]	OBL
SEDGE,UPTIGHT	Carex stricta	C [6-25%]	OBL
BEAKRUSH,BROWINISH	Rhynchospora capitellata	S [<5%]	OBL
LOOSESTRIFE,PURPLE	Lythrum salicaria	A [26-50%]	FACW+
RUSH,SOFT	Juncus effusus	C [6-25%]	FACW+
FERN,CINNAMON	Osmunda cinnamomea	S [<5%]	FACW
JOE-PYE-WEED,HOLLOW	Eupatoriadelphus fistulosus	S [<5%]	FACW
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	C [6-25%]	FACW
GOLDEN-ROD,GIANT	Solidago gigantea	S [<5%]	FACW
REED,COMMON	Phragmites australis	C [6-25%]	FACW
CREEPER,VIRGINIA	Parthenocissus quinquefolia	C [6-25%]	FACU
	Solidago sp.	C [6-25%]	
Sapling/Lianas			
ALDER,SPECKLED	Alnus rugosa	C [6-25%]	FACW+
ELM,AMERICAN	Ulmus americana	S [<5%]	FACW-
PINE,EASTERN WHITE	Pinus strobus	S [<5%]	FACU
ASPEN,QUAKING	Populus tremula	S [<5%]	FACU
MAPLE,RED	Acer rubrum	S [<5%]	FAC
COTTON-WOOD,EASTERN	Populus deltoides	S [<5%]	FAC
Shrub			
ROSE,SWAMP	Rosa palustris	S [<5%]	OBL
WINTERBERRY,COMMON	Ilex verticillata	S [<5%]	FACW+
ARROW-WOOD,NORTHERN	Viburnum recognitum	C [6-25%]	FACW-
ROSE,MULTIFLORA	Rosa multiflora	S [<5%]	FACU
IVY,POISON	Toxicodendron radicans	S [<5%]	FAC
Tree			
MAPLE,RED	Acer rubrum	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Seasonally Flooded Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >24 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
1-0	O	/	Muck		/	/	
0-7	A1	10YR 2 / 1	Very Fine Sandy Loam, Muck	10	/	/	
7-14	A2	10YR 2 / 1	Fine Sandy Loam, Muck		/	/	
14-24	A3	10YR 2 / 2	Very Fine Sandy Loam		/	/	pockets of A2 mixed in A3



Town of Franklin

Wetland Replication Data Report



Site: 7 Franklin
Investigators: Bob Hartzel, Sara Konrad

MA Norfolk County

Investigation Date: 9/26/2002 14:12
Weather: Overcast

Location: 7-W Easting: 208,011.75 Northing: 871,437.20 NWIClass: Palustrine Forested Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 653,654
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
SKUNK-CABBAGE	Symplocarpus foetidus	C [6-25%]	OBL
BOG MOSS	Aulacomnium palustre	S [<5%]	NI
LOOSESTRIFE, PURPLE	Lythrum salicaria	C [6-25%]	FACW+
FERN, SENSITIVE	Onoclea sensibilis	C [6-25%]	FACW
REED, COMMON	Phragmites australis	C [6-25%]	FACW
NIGHTSHADE, CLIMBING	Solanum dulcamara	S [<5%]	FAC-
Sapling/Lianas			
ALDER, SPECKLED	Alnus rugosa	C [6-25%]	FACW+
Shrub			
ROSE, SWAMP	Rosa palustris	S [<5%]	OBL
BLUEBERRY, HIGHBUSH	Vaccinium corymbosum	C [6-25%]	FACW-
ARROW-WOOD, NORTHERN	Viburnum recognitum	C [6-25%]	FACW-
TOUCH-ME-NOT, SPOTTED	Impatiens capensis	C [6-25%]	FACW
ROSE, MULTIFLORA	Rosa multiflora	S [<5%]	FACU
WITCH-HAZEL, AMERICAN	Hamamelis virginiana	S [<5%]	FAC-
Tree			
MAPLE, RED	Acer rubrum	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Seasonally Flooded Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >20 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0-20	A	10YR 2 / 1	Fine Sandy Loam, Muck		/	/	
20-21	B	10YR 5 / 2	Very Fine Sand		/	/	



Town of Franklin

Wetland Replication Data Report



Site: 8 Franklin MA Norfolk County Investigation Date: 9/30/2002 14:00
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 8-1 Easting: 204,856.94 Northing: 875,362.32 NWIClass: Palustrine Scrub-Shrub Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: No
Are Hydric Soils Present?: No Is this a Wetland?: No Photos: 661,662
Comments: Deer droppings

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
CAREX SP.	Carex sp.	C [6-25%]	NI
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	C [6-25%]	FACW-
BLACKBERRY,BRISTLY	Rubus hispidus	S [<5%]	FACW
FERN,CINNAMON	Osmunda cinnamomea	A [26-50%]	FACW
PINE,EASTERN WHITE	Pinus strobus	S [<5%]	FACU
SARSAPARILLA,WILD	Aralia nudicaulis	C [6-25%]	FACU
TEABERRY	Gaultheria procumbens	S [<5%]	FACU
MAPLE,RED	Acer rubrum	S [<5%]	FAC
	Solidago sp.	S [<5%]	
Sapling/Lianas			
OAK,NORTHERN RED	Quercus rubra	S [<5%]	FACU-
ASPEN,QUAKING	Populus tremula	S [<5%]	FACU
BIRCH,GRAY	Betula populifolia	C [6-25%]	FAC
MAPLE,RED	Acer rubrum	C [6-25%]	FAC
COTTON-WOOD,EASTERN	Populus deltoides	D [>50%]	FAC
Shrub			
AZALEA,SWAMP	Rhododendron viscosum	S [<5%]	OBL
BLUEBERRY,HIGHBUSH	Vaccinium corymbosum	C [6-25%]	FACW-
WITHE-ROD	Viburnum cassinoides	S [<5%]	FACW
CHERRY,BLACK	Prunus serotina	S [<5%]	FACU
PINE,EASTERN WHITE	Pinus strobus	C [6-25%]	FACU
WITCH-HAZEL,AMERICAN	Hamamelis virginiana	C [6-25%]	FAC-
MAPLE,RED	Acer rubrum	S [<5%]	FAC
Tree			
COTTON-WOOD,EASTERN	Populus deltoides	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >18 inches
Comments:

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
2-0	O	/	Muck		/	/	
0-3	A1	10YR 2 / 1	Fine Sandy Loam		/	/	
3-6	A2	10YR 2 / 2	Fine Sandy Loam		/	/	
6-12	B1	10YR 3 / 3	Fine Sandy Loam, Gravel		/	/	
12-15	B2	10YR 4 / 2	Sand, Gravel		/	/	
15-18+	C	10YR 5 / 2			/	/	



Town of Franklin

Wetland Replication Data Report



Site: 8 Franklin MA Norfolk County Investigation Date: 9/30/2002 14:00
Investigators: Bob Hartzel, Jeff Rogers, Ingeborg Hegman Weather: Sunny

Location: 8-W Easting: 204,868.14 Northing: 875,358.78 NWIClass: Palustrine Forested Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 659,650
Comments:

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
CAREX SP.	Carex sp.	S [<5%]	NI
WINTERBERRY, COMMON	Ilex verticillata	S [<5%]	FACW+
FERN, CINNAMON	Osmunda cinnamomea	S [<5%]	FACW
PARTRIDGE-BERRY	Mitchella repens	C [6-25%]	FACU
SARSAPARILLA, WILD	Aralia nudicaulis	S [<5%]	FACU
WITCHGRASS, DEER-TONGUE	Dichanthelium clandestinum	S [<5%]	FAC+
Sapling/Lianas			
PINE, EASTERN WHITE	Pinus strobus	S [<5%]	FACU
MAPLE, RED	Acer rubrum	C [6-25%]	FAC
Shrub			
AZALEA, SWAMP	Rhododendron viscosum	C [6-25%]	OBL
BLUEBERRY, Highbush	Vaccinium corymbosum	C [6-25%]	FACW-
WITHE-ROD	Viburnum cassinoides	C [6-25%]	FACW
PEPPER-BUSH, COAST	Clethra alnifolia	C [6-25%]	FAC+
MAPLE, RED	Acer rubrum	S [<5%]	FAC
Tree			
OAK, WHITE	Quercus alba	C [6-25%]	FACU-
MAPLE, RED	Acer rubrum	A [26-50%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: >18 inches
Buttressed Trees
Water-Stained Leaves
Water Marks
Drainage Patterns

Comments: Hummocky, 6" deep root system indicating fluctuating water levels

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
2-0	O	/	Peat		/	/	
0-10	A	10YR 2 / 1	Loam		/	/	
10-16	B	10YR 2 / 2	Sandy Loam		/	/	
16-18+	C	10YR 4 / 2	Fine Sand	20	/	/	



Town of Franklin

Wetland Replication Data Report



Site: 9 Franklin
Investigators: Bob Hartzel, Sara Konrad

MA Norfolk County

Investigation Date: 9/26/2002 13:00
Weather: Overcast

Location: 9-1 Easting: 206,451.76 Northing: 874,337.07 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 673
Comments: Red maples border wetland

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
Herbs			
MONKEY-FLOWER, ALLEGHANY	Mimulus ringens	S [<5%]	OBL
CATTAIL, NARROW-LEAF	Typha angustifolia	S [<5%]	OBL
VERVAIN, BLUE	Verbena hastata	C [6-25%]	FACW+
RUSH, SOFT	Juncus effusus	D [>50%]	FACW+
WOOL-GRASS	Scirpus cyperinus	C [6-25%]	FACW+
LOOSESTRIFE, PURPLE	Lythrum salicaria	S [<5%]	FACW+
ARROW-WOOD, NORTHERN	Viburnum recognitum	S [<5%]	FACW-
WITCHGRASS, DEER-TONGUE	Dichanthelium clandestinum	S [<5%]	FAC+
Tree			
BIRCH, RIVER	Betula nigra	S [<5%]	FACW

Representative Hydrologic Characteristics

Hydrologic Conditions: Saturated Depth of Surfacewater: inches **Other Hydrologic Indicators present:**
Depth to Groundwater: inches Depth to Saturation: 0 inches
Comments: Saturated to surface

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0.5-0	Oe	/	Peaty Muck		/	/	
0-6	A1	10YR 3 / 2	Fine Sandy Loam	20	5YR 4 / 6	/	
6-12	B1	2.5Y 4 / 2	Silt Loam, Sand	40	/	/	
12-15	B2	2.5Y 3 / 1		40	/	/	refusal at 15"



Town of Franklin

Wetland Replication Data Report



Site: 9 Franklin
Investigators: Bob Hartzel, Sara Konrad

MA Norfolk County

Investigation Date: 9/26/2002 13:00
Weather: Overcast

Location: 9-W Easting: 206,472.64 Northing: 874,313.99 NWIClass: Palustrine Emergent Wetland
Are Hydrophytic Plants Dominant? Yes Is Wetland Hydrology Present?: Yes
Are Hydric Soils Present?: Yes Is this a Wetland?: Yes Photos: 674
Comments: Near edge of replication, boundary uncertain

Vegetation

Common Name	Scientific Name	Dominance	Indicator Status
<i>Herbs</i>			
BUGLEWEED,VIRGINIA	Lycopus virginicus	S [<5%]	OBL
MONKEY-FLOWER,ALLEGHANY	Mimulus ringens	C [6-25%]	OBL
CATTAIL,BROAD-LEAF	Typha latifolia	C [6-25%]	OBL
IRONWEED,NEW YORK	Vernonia noveboracensis	S [<5%]	FACW+
ASTER,NEW YORK	Aster novi-belgii	C [6-25%]	FACW+
RUSH,SOFT	Juncus effusus	D [>50%]	FACW+
BLACKBERRY,BRISTLY	Rubus hispidus	S [<5%]	FACW
MINT,FIELD	Mentha arvensis	S [<5%]	FACW
TOUCH-ME-NOT,SPOTTED	Impatiens capensis	S [<5%]	FACW
STRAWBERRY,VIRGINIA	Fragaria virginiana	S [<5%]	FACU
GRAPE,FOX	Vitis labrusca	S [<5%]	FACU
FRAGRANT-GOLDEN-ROD,FLAT-TOP	Euthamia graminifolia	C [6-25%]	FAC

Representative Hydrologic Characteristics

Hydrologic Conditions: Depth of Surfacewater: inches Other Hydrologic Indicators present:
Depth to Groundwater: inches Depth to Saturation: 6 inches
Comments: Perched wetland

Representative Soil Characteristics

Depth (in)	Horizon	Matrix Color	Coarseness	Redox Percentage	Concentration Color	Reduction Color	Comments
0.5-0	O	/			/	/	
0-6	A	10YR 3 / 2	Fine Sandy Loam, Gravel		/	/	
6-18	B	10YR 4 / 2	Very Fine Sandy Loam	50	10YR 4 / 6	10YR 6 / 3	

APPENDIX 2:

Wetland Functions and Values Assessment Sheets

Wetland Function-Value Evaluation Form

Total area of wetland 2015 sf* Human made? yes Is wetland part of a wildlife corridor? _____ or a "habitat island"? X

Adjacent land use residential Distance to nearest roadway or other development 20 feet

Dominant wetland systems present _____ Not a wetland _____ Contiguous undeveloped buffer zone present NA

Is the wetland a separate hydraulic system? NA If not, where does the wetland lie in the drainage basin? NA

How many tributaries contribute to the wetland? NA Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #1













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ☒ Field ☒

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	<input checked="" type="checkbox"/>		7		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>		9, 13		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat					
 Sediment/Toxicant Retention					
 Nutrient Removal	<input checked="" type="checkbox"/>		3,4,8		In spite of non-wetland status, these functions are somewhat present.
 Production Export					
 Sediment/Shoreline Stabilization					
 Wildlife Habitat					
 Recreation					
 Educational/Scientific Value					
 Uniqueness/Heritage					
 Visual Quality/Aesthetics					
ES Endangered Species Habitat					
Other					

Notes:

* Refer to backup list of numbered considerations.

* This replication area does not meet the regulatory definition of a wetland (lacks dominant wetland vegetation and hydric soils). However, its position adjacent to a stream and downgradient to adjacent uplands allows for the functions and values listed above to be somewhat relevant.

Wetland Function-Value Evaluation Form

Total area of wetland Not built Human made? NA Is wetland part of a wildlife corridor? NA or a "habitat island"? NA

Adjacent land use apartment building Distance to nearest roadway or other development NA

Dominant wetland systems present Not a wetland Contiguous undeveloped buffer zone present NA

Is the wetland a separate hydraulic system? NA If not, where does the wetland lie in the drainage basin? NA

How many tributaries contribute to the wetland? NA Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #2













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ☒ Field ☒

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge				In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration				In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention				
 Nutrient Removal				In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat				
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

* This replication area was apparently never constructed.

Wetland Function-Value Evaluation Form

Total area of wetland 5826 sf Human made? yes Is wetland part of a wildlife corridor? yes or a "habitat island"? _____

Adjacent land use forested open space Distance to nearest roadway or other development 220 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present approx. 200 feet

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adjacent to stream

How many tributaries contribute to the wetland? NA Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #3

Latitude _____ Longitude _____













Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:

Office ☒ Field ☒

Corps manual wetland delineation
completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	<input checked="" type="checkbox"/>	7,9,15		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>	5,6,7,8,9,10,13		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention		3,4,10,12		
 Nutrient Removal	<input checked="" type="checkbox"/>	3,5,9,10,11,		In spite of non-wetland status, these functions are somewhat present.
 Production Export	<input checked="" type="checkbox"/>	1,4		
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	<input checked="" type="checkbox"/>	4, 6,7,8,11,14,17,19, 20	X	Abundant signs of wildlife use: beaver chewings, mammal paths, birds, etc.
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics	<input checked="" type="checkbox"/>	2,5,6,9,10,11		Easy access and viewing from cart path south of Bridle Path Road
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 11,416 sf Human made? yes Is wetland part of a wildlife corridor? _____ or a "habitat island"? X

Adjacent land use roads, forest, residential Distance to nearest roadway or other development 40 feet

Dominant wetland systems present Palustrine Scrub-Shrub Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adjacent to forested wetland

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #4













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	✓	3,5,6,9,13,18		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention	✓	1,2,4,9, 10	X	
 Nutrient Removal	✓	3,4,7,8,9,10,11	X	In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	✓	6,8,13		
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 391 sf* Human made? yes Is wetland part of a wildlife corridor? _____ or a "habitat island"? X

Adjacent land use roads, forest, residential Distance to nearest roadway or other development 8 feet

Dominant wetland systems present Palustrine Scrub-Shrub Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adjacent to int. stream

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #5













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ☒ Field ☒

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration				In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention	<input checked="" type="checkbox"/>	1,2,4		Limited function due to very small size.
 Nutrient Removal	<input checked="" type="checkbox"/>	3,4,7,8,9,10,11	X	In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	<input checked="" type="checkbox"/>	8,13		Limited function due to very small size.
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

* Current replication area size (391 s.f.) is less than estimated constructed size (1,170 s.f.), due to recent filling of the center section as part of development on adjacent parcel. The replication does not meet its intended function as a vernal pool due to insufficient size and water holding capacity. Although shrub and herbaceous species provide wildlife food sources, area is too small to provide significant habitat values.

Wetland Function-Value Evaluation Form

Total area of wetland 3,916 sf Human made? yes Is wetland part of a wildlife corridor? _____ or a "habitat island"? X

Adjacent land use residential Distance to nearest roadway or other development 200 feet

Dominant wetland systems present Palustrine Scrub-Shrub Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to forested wetland

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #6













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge				In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	✓	3,9,13,18		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention	✓	2,4,9		potential attenuation of pesticides from adjacent lawns, etc.
 Nutrient Removal	✓	4,8,9,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	✓	6,7,8,13		
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 2993 sf Human made? yes Is wetland part of a wildlife corridor? _____ or a "habitat island"? X

Adjacent land use road, forest, residential Distance to nearest roadway or other development 15 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to forested wetland

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. _____ Replication # 7













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ☒ Field ☒

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	<input type="checkbox"/>	<input type="checkbox"/>	7	In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3,5,6,8,9,18	In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat	<input type="checkbox"/>	<input type="checkbox"/>		
 Sediment/Toxicant Retention	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2,4, 10, 15, 16	runoff from adjacent road
 Nutrient Removal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3,4,7,8,9,10,11	In spite of non-wetland status, these functions are somewhat present.
 Production Export	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,7,9,12,	
 Sediment/Shoreline Stabilization	<input type="checkbox"/>	<input type="checkbox"/>		
 Wildlife Habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7,8,13,14	good species diversity for a relatively small replication area
 Recreation	<input type="checkbox"/>	<input type="checkbox"/>		
 Educational/Scientific Value	<input type="checkbox"/>	<input type="checkbox"/>		
 Uniqueness/Heritage	<input type="checkbox"/>	<input type="checkbox"/>		
 Visual Quality/Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>		
ES Endangered Species Habitat	<input type="checkbox"/>	<input type="checkbox"/>		
Other	<input type="checkbox"/>	<input type="checkbox"/>		













Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 4560 sf Human made? yes Is wetland part of a wildlife corridor? yes or a "habitat island"? _____
 Adjacent land use road, forest, residential Distance to nearest roadway or other development 15 feet
 Dominant wetland systems present Palustrine Scrub-Shrub Contiguous undeveloped buffer zone present no
 Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to forested wetland
 How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #8
 Latitude _____ Longitude _____
 Prepared by: RH Date 2/18/03
 Wetland Impact:
 Type _____ Area _____
 Evaluation based on:
 Office ☒ Field ☒
 Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7,9		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration				In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention	<input checked="" type="checkbox"/>	2,4,10		marginal wetland function due to inadequate grading
 Nutrient Removal	<input checked="" type="checkbox"/>	3,4,7,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	<input checked="" type="checkbox"/>	6,7	X	
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland replication provides only marginal wetland functions and values due to inadequate grading and limited hydrology.

Wetland Function-Value Evaluation Form

Total area of wetland 10,437 sf Human made? yes Is wetland part of a wildlife corridor? _____ or a "habitat island"? X

Adjacent land use residential Distance to nearest roadway or other development 40 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? yes If not, where does the wetland lie in the drainage basin? _____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #9













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge				In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	✓	3,5,6,7,8,9,18		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention		4		
 Nutrient Removal		3,4,8,9,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	✓	6,7,8,13	X	
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics	✓	9,11,12		
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland Not built Human made? _____ Is wetland part of a wildlife corridor? NA or a "habitat island"? _____

Adjacent land use _____ residential _____ Distance to nearest roadway or other development 45 feet

Dominant wetland systems present _____ NA _____ Contiguous undeveloped buffer zone present _____ no

Is the wetland a separate hydraulic system? NA If not, where does the wetland lie in the drainage basin? _____

How many tributaries contribute to the wetland? NA Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #10













Latitude _____ Longitude _____

Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office ☒ Field ☒

Corps manual wetland delineation completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge				In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration				In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention				
 Nutrient Removal				In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat				
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

It appears that this replication area was never constructed.

Wetland Function-Value Evaluation Form

Total area of wetland 1,600 sf Human made? yes Is wetland part of a wildlife corridor? yes or a "habitat island"? _____

Adjacent land use open space, commercial Distance to nearest roadway or other development 35 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to Mine Brook BVW

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #11-A

Latitude _____ Longitude _____













Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:

Office ☒ Field ☒

Corps manual wetland delineation
completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7,10		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>	5,6,7,8,13,18	X	In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention				
 Nutrient Removal	<input checked="" type="checkbox"/>	3,5,7,8,9,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export		1,7,9		
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	<input checked="" type="checkbox"/>	7,8,11,13,14,19,20	X	
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 1000 sf Human made? yes Is wetland part of a wildlife corridor? yes or a "habitat island"? _____

Adjacent land use open space, commercial Distance to nearest roadway or other development 70 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to Mine Brook BVW

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #11-B

Latitude _____ Longitude _____













Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:

Office ☒ Field ☒

Corps manual wetland delineation
completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7,10		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>	5,6,9,13,18		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention				
 Nutrient Removal	<input checked="" type="checkbox"/>	3,7,8,9,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export		7		
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	<input checked="" type="checkbox"/>	7,13	X	
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 2900 sf Human made? yes Is wetland part of a wildlife corridor? yes or a "habitat island"? _____

Adjacent land use open space Distance to nearest roadway or other development 90 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to Mine Brook BVW

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #11-C

Latitude _____ Longitude _____













Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:

Office ☒ Field ☒

Corps manual wetland delineation
completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7,10		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>	5,6,9,13,18		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention		3,4		
 Nutrient Removal	<input checked="" type="checkbox"/>	3,7,8,9,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export		1,7,9		
 Sediment/Shoreline Stabilization				
 Wildlife Habitat	<input checked="" type="checkbox"/>	7,8,13,14,19,20	X	
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 350 sf Human made? yes Is wetland part of a wildlife corridor? marginal* or a "habitat island"? _____

Adjacent land use commercial, transportation Distance to nearest roadway or other development 100 feet

Dominant wetland systems present Palustrine Emergent Contiguous undeveloped buffer zone present no

Is the wetland a separate hydraulic system? no If not, where does the wetland lie in the drainage basin? adj. to Mine Brook BVW

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Replication #12

Latitude _____ Longitude _____













Prepared by: RH Date 2/18/03

Wetland Impact:
Type _____ Area _____

Evaluation based on:

Office ☒ Field ☒

Corps manual wetland delineation
completed? Y _____ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge		7		In spite of non-wetland status, these functions are somewhat present.
 Floodflow Alteration	<input checked="" type="checkbox"/>	3,6,9,13,18		In spite of non-wetland status, these functions are somewhat present.
 Fish and Shellfish Habitat				
 Sediment/Toxicant Retention				
 Nutrient Removal	<input checked="" type="checkbox"/>	3,8,9,10,11		In spite of non-wetland status, these functions are somewhat present.
 Production Export				
 Sediment/Shoreline Stabilization				
 Wildlife Habitat		7,8,13		
 Recreation				
 Educational/Scientific Value				
 Uniqueness/Heritage				
 Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes:

* Refer to backup list of numbered considerations.

* This very small replication area is connected to BVW adjacent to Mine Brook, but is largely isolated from functioning as part of a wildlife corridor by surrounding commercial land uses and fencing to west of I-495 offramp.